

(RE)envisioning anderson's urban brownfields



a vision for revitalizing general motors
brownfields in anderson, indiana

Derrek T. Fields
Department of Landscape Architecture
Undergraduate Thesis 2011

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Undergraduate Thesis + April 2011
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Automotive manufacturing has greatly impacted the development and identity of Anderson, Indiana, from industrialization to deindustrialization. This project examines three General Motors brownfields in Anderson for revitalization and redevelopment. Revitalization efforts of the brownfields will create an urban corridor masterplan and establish a connection between the spaces and the city.

Understanding specific brownfield site concerns and successful urban spaces will be essential to transform these spaces into urban corridors. Sustainable design strategies will be used to produce an urban corridor master plan for Anderson's GM brownfields. The potential and value of revitalizing brownfield properties increases public health, environmental health, economic health, and the overall aesthetic of the city. Rebuilding the city of Anderson begins with revitalization and redevelopment of the automotive brownfields within the city.

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I extend a sincere thank you for all who provided inspiration, gave advice and continuous support, and helped me complete this project.

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On March 31, 1887, natural gas was discovered throughout central Indiana known as “The Gas Boom.” With this new discovery of natural gas and the continual growth of railroads, rapid development and expansion engulfed many Indiana towns creating an industrial boom. One particular city that experienced this wave of development was Anderson. The city, known as the “Queen City of the Gas Belt,” constructed 37 new factories within a two year period increasing the population by 489 percent over the next twenty years (Consolidated Plan, 10).

Almost as quickly as the gas boom fueled the cheap energy needs of Anderson it would soon bring it spiraling down. By 1912, natural gas wells were tapped dry but the city turned to a new form of industrialization, automotive manufacturing. By the turn of the 20th century no industry had been more important to Anderson than automotive manufacturing (Consolidated Plan, 11). Over the auto industry time period in the city, Delco-Remy was the “industrial foundation in central Indiana” and its operations were headquartered in Anderson (Indiana Business Magazine). Seemingly like every other automotive industry, Delco-Remy merged with General Motors establishing Anderson as one of the largest manufacturers of automotive electric equipment.



Figure 1.1: Plant 18 from the abandoned parking lot.

During the times of the early 20th century Anderson was the place to be; however, the end of the century brought drastic changes to the city, as well as the entire country, in the form of deindustrialization. More than 18,000 manufacturing jobs (Indiana Business Magazine) vanished in Anderson alone by 1994. The results of the industrial downturn in Anderson are illustrated through a devastated economy, dwindling population, loss of city identity, and vacant brownfield eyesores.

As of today, Anderson is littered with 150 brownfields encompassing approximately 1000 acres of land (Consolidated Plan, 69). Park facilities within the city comprise just over 800 acres, and with the parks department experiencing over 70% budget cuts in recent years Anderson will face a challenge of maintaining existing green spaces.

Although there is an unimaginable amount of brownfields in Anderson, this project looks at the three specific General Motors brownfields comprising over 200 acres of land. Automotive manufacturing has greatly impacted the development and identity of Anderson, from industrialization to deindustrialization. Because of the automotive manufacturing influence in the city and the extensive size of the General Motors brownfields, they were selected for the revitalization effort of this project. The purpose of this project is to establish a revitalization effort for the three specific brownfield sites within Anderson to create an urban corridor and reconnection within the city. The potential and value of revitalizing unused industrial properties includes increased public health, environmental health, economic health, and the overall aesthetic of the city. By redeveloping brownfields Anderson will gain a new identity true to its character, a green city of tomorrow.

In order to produce an urban corridor master plan for Anderson's General Motors brownfields it is important to first research and understand relevant information. This literature review analyzes site specific concerns of Anderson's General Motors brownfields, understands community needs that will reconnect brownfields to the city and its context, reviews sustainable strategies from completed redevelopment projects, and identifies economical and environmental benefits of brownfield redevelopment in Anderson.

the brownfields

After General Motors withdrew from Anderson the city was left in shambles. A loss of jobs created an outflow of population, in turn resulting in abandoned factories and homes. Unused plants soon had a single purpose for Anderson and its community; they acted as decaying industrial brownfields. This section looks to understand the three largest General Motors brownfields for revitalization: Plant 16 (Jefferson Parcel), Plant 18 and consolidated properties (Monroe, Adams, and Mounds Parcels), and Plant 20 (Helena Parcel).

Each property is unique in size, previous use, existing use, surrounding context, potential contamination, and cleanup strategies. In order to diagnose site contamination the Environmental Protection Agency (EPA) conducts Phase I and II assessments. Phase I consists of detailing records to determine already known contaminants while Phase II analyzes soil and water samples from across the site (Russ, 29). In the absence of Phase I and II assessments, my assumptions about contamination on the site rely on analysis of site conditions and an examination of EPA brownfield contaminants. In order to understand the individual brownfields, each of these details will be considered with a large focus on previous use, potential contamination, and recommended cleanup strategies.

[Plant 16 - Jefferson Parcel]

Plant 16 was constructed as a maintenance, tooling and central stores operation. Although it was built to house maintenance and central stores, the plant's main focus was manufacturing tools and dyes. The plant operated from 1959 to 1994 (Jackson) before the lights were officially turned off. However, shortly after the building closed it turned the lights back on to continue operation as a Delphi tooling facility (Jackson). Delphi soon lost its presence in Plant 16 for good and as of today the property is owned by the City of Anderson. The plant

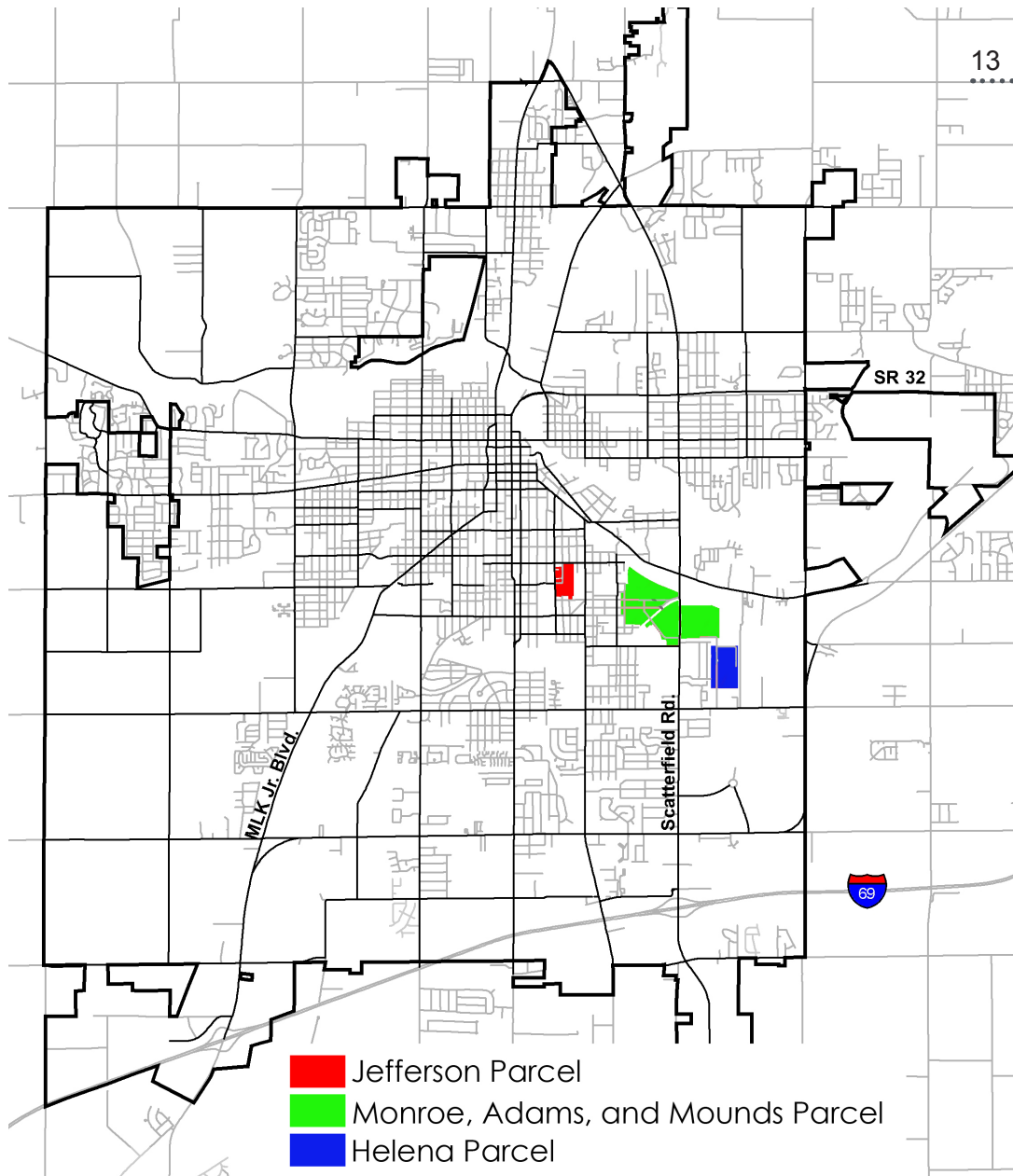


Figure 2.1: Specific site location within the city of Anderson.

stands vacant and unused. It is now an eyesore to the surrounding residential community and an adjacent school, Liberty Christian Secondary School.

Considering the site's historical operations of tooling and dye manufacturing, the contaminant groups assumed to be present at the Jefferson Parcel are volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), both halogenated and non-halogenated, and metals and metalloids (EPA, Road Map). The specific types of contaminants will depend on the exact materials and processes used for tooling and dye manufacturing. On the other hand, having

a strong assumption of potential site contamination allows for site concerns.

Chemical processes, as in dye manufacturing, can cause a site to be overlaid with generations of wastes from multiple processes and operations (EPA, Road Map). Chemical facilities may contaminate isolated locations if small amounts are used, or environmental contamination can persist in surface waters and sediments away from the site. Tool manufacturing, in regards to being produced by metal fabrications, usually generate waste metals, lubricants, and cleaners (EPA, Road Map). If the waste material is somehow not disposed correctly it can contaminate soil and groundwater.

Since the Jefferson parcel is surrounded by residential communities and a school, it is appropriate to remediate this brownfield site with strategies that appeal aesthetically as well as benefit the environment. The major contaminants assumed are VOCs and SVOCs. An ideal remediation technology for this specific brownfield will focus on phytoremediation and air sparging. The inclusion of air sparging as a remediation technology will allow for harmful VOCs and SVOCs to be removed from groundwater and surface water; this type of remediation does not cleanse soils or sediments. Air sparging injects air into groundwater to flush volatile contaminants (Russ, 85). Phytoremediation is an emerging remediation technology that treats soils and sediments as well as groundwater and surface water. It creates an “exciting opportunity for expanding the use of plants materials on an impacted site” (Russ, 88). Phytoremediation is a process which uses plants to remove, transfer, stabilize, or destroy contaminants on an impacted brownfield (EPA, Road Map).

[Plant 18 - Monroe, Adams, and Mounds Parcels]

The parcels of Monroe, Adams, and Mounds combine to cover just less than 163 acres of land. This particular chunk of land consists of Plant 18 and the demolished plants 3, 7, 10, 11, and 17 (COA, Monroe). The City of Anderson stakes ownership over these properties and have lumped them together to form an expansive brownfield site. The property is split in two sections compliments of Scatterfield Road. Plant 18 was constructed in 1961 to house offices, research and product test labs, and general manufacturing. This plant experienced multiple functions and uses over its lifetime including being the location of division headquarters, battery and control, product engineering, and a testing lab complex (Jackson).

Looking through the history of Plant 18 and all the other plants on this brownfield site, it is easy to say that this site is the most contaminated of the three. Monroe, Adams, and Mounds parcels are assumed to be contaminated with both halogenated and non-halogenated VOCs, both halogenated and non-halogenated SVOCs, fuels, and metals and metalloids (EPA, Road Map). Processes and materials used throughout these plants have high probabilities in soil, groundwater, and surface water contamination.

Multiple contaminants existing within a single brownfield will need to be addressed by a combination of strategies with the possibility of a hierarchy of responses (Russ, 84). The brownfield consisting of Monroe, Adams, and Mounds parcels create an interesting, yet expansive, opportunity for multiple remediation technologies. The system of processes that will be used on this brownfield are solvent extraction, multi-phase extraction, and phytoremediation. Solvent extraction uses an organic solvent to separate and extract contaminants from soil particles (EPA, Road Map). Multi-phase extraction uses a vacuum system to remove contaminants from groundwater and vapors from the subsurface (EPA, Road Map). With the implementation of solvent and multi-phase extraction the brownfield's soil and groundwater should be almost entirely cleansed of contaminants. The final step incorporates phytoremediation to remove any remaining contaminants from soils and groundwater.

[Plant 20 - Helena Parcel]

Built in 1972, Plant 20 had a sole purpose to produce high energy ignitions (Jackson). Since the plant only manufactured one type of part it never experienced the changes in location that the other plants often did. Plant 20 was one of the last GM plants to close down in the city simply because it was the only plant that could manufacture high energy ignitions. Like every other GM plant in Anderson, the plant on the Helena parcel stands vacant and unused.

The Helena parcel is not as complex as the other two brownfield sites but contains a wastewater treatment facility. Based on the manufacturing of a high energy ignition, the soils and groundwater have a high probability to be contaminated with halogenated and non-halogenated VOCs. According to USGS and EPA scientists, wastewater treatment plants are a leading source of pharmaceuticals in rivers (USGS). Extending beyond its parcel boundary, this brownfield and its contaminants stretch far distances through water travel.

Unlike the other two brownfield sites, the Helena parcel is not assumed to be heavily contaminated. A single type of remediation will be used for this site: bioremediation. Bioremediation removes all contaminants except metals and metalloids, which is ideal since this brownfield contains no metals or metalloids in soils or groundwater. The “technical and economic advantage of bioremediation is the expected minimal impact” (Russ, 85) of remediation technologies. In other words, bioremediation is the most economically and environmentally friendly remediation strategy.

reconnecting spaces

This section reviews the needs for the city of Anderson. The city’s consolidated plan laid the foundation for what assets the community needs. Passing through the city one cannot help but get a feel of disconnect between the social and economical environments. In order for Anderson to regain its identity and become a unified city there is a need for new housing development, job creation, transportation alternatives, and a green network system.

Anderson categorizes housing needs and affordable housing into three categories: homeownership, special needs housing, and tenant based rental housing. Owner-occupied housing is an “essential component of community development in Anderson” (Consolidated Plan, 38). Although homeownership plays a vital role in community development, it has been discovered that there is a shortage in available housing. There is noted to be a surplus of rental units but this surplus includes units that are substandard, dilapidated, abandoned, or demolished. The greatest need for rental units is sought by the 25-34 age groups. In an attempt to keep a younger labor force in the city the need for new rental housing is high.

Anderson has lower wages and higher unemployment rates compared to the rest of Indiana. Almost 20% of individuals and 15% of families in Anderson had incomes below the federal poverty level (Consolidated Plan, 56). With the closure of the automotive industry, primary employment in Anderson has moved from manufacturing to health-care. Economic development and the creation of jobs are Anderson’s mayor Kris Ockomon’s top priority.

The only current public transportation in Anderson is a bus service known as CATS, or the City of Anderson Transit System. There are

only six routes traveled by the public buses and community members agree that “routes do not extend far enough” or “bus services end too early” (Consolidated Plan, 58). There exists a need for greater public transportation throughout the city of Anderson in the form of potential light rail, redeveloped bus system, bike lanes and trails, and greenway systems.

With the loss of identity in Anderson, a major disconnect and loss of public ownership in green spaces have created another void within the city. The city has also expressed concern with health levels of Anderson, explaining the need to “improve people’s health” (Consolidated Plan, 59). There is no real connection from green space to green space and the only walking trails are those located in parks. Redeveloping Anderson’s General Motors brownfields creates the perfect opportunity to fulfill the community’s needs of developing new housing, creating jobs, providing alternative transportation, and establishing a green network within the city.

case study strategies

[*Brownfields to Greenfields*]

“Greening brownfields plays an important role in bringing people together, providing recreational opportunities, promoting health and wellness, and enjoying scenic beauty...and become important connecting places” (DeSousa, 212).

In Los Angeles, Vista Hermosa Natural Park sits atop what was once the “largest active oil field on the West Coast” (Jost, 84). The park lies on the edge of downtown in an underclass neighborhood that previously had minimal amounts of green space. Since the community was encouraged to aid in the design process, the park meets the needs of the surrounding residents through passive and active recreation while incorporating sustainable features. With the feel of “a summer camp or a national park” (Jost, 83), the park provides a natural escape into a much needed area of the city. The key element from Vista Hermosa Natural Park to be used in the design of Anderson’s brownfields is the balance of recreation in the park and the connections to the surrounding context.

[Residential and Mixed Use]

Hope Crossing, located in Oklahoma City, Oklahoma, is a neighborhood development with a major focus on energy efficient and environmentally conscious housing units. All residential units meet at least LEED Silver standards for new construction with design features such as geothermal heating/cooling and foam insulation. The project establishes a sustainable infrastructure for public and private spaces while educating and encouraging resident involvement (SSI). Meanwhile, other key elements of sustainable design provide the new community to be self-sufficient benefitting the natural environment. To balance the built form there are three parks, walking trails, and considerate amounts of open space.

Looking beyond residential development, mixed-use development creates a place for people to live, work, and play. In Atlanta, Georgia, a model community for new urbanism and sustainable environmental design stands on a brownfield site that was almost completely covered by impervious concrete (SSI). Glenwood Park accounts for environmental protection and restoration; street tree incentives add aesthetic appeal and provide climate control. Other philosophies of the new development include a place for commerce, a place to live, work, and gather, and creating a walkable community (Green Street Properties).

[European Lessons]

Northala Fields in London has been recognized as the largest park built in the city for a century. This 18.5 hectare park is one piece of a network of open spaces covering more than 100 hectares. The most notable features within the park are four massive mounds, the tallest stands 90 feet above ground level, which cap recycle rubble from Wembley Stadium and displaced materials from Terminal 5 at Heathrow (Coulthard, 95). The mounds propel people into movement, act as a screen from highway traffic noise, offer stunning views, and are entirely playful. Habitat restoration and protection occurs throughout the site, and a new network of lakes and channels manage stormwater and groundwater on-site. The main type of cleanup that occurs at Northala Fields is the biological remediation processes of plant materials. Large meadows and lush vegetation cleanse the soil of any existing contaminants. The main feature from this project to incorporate in the design of GM brownfields is the creation of multiple networks using vegetated and water systems.

Figure 2.4: Northala Fields



Figure 2.3: Glenwood Park



Figure 2.2: Vista Hermosa Natural Park



economy and environment

A study by IDEC discovered the “value of property located adjacent to brownfield-to-green space projects rose by an average of 106%, with a median of 86%, and citywide property values increased by 25%” (DeSousa, 167).

One major economic benefit of brownfield redevelopment is the interest in new investment. Based on the needs of the surrounding site communities and the city of Anderson, investment in residential and mixed-use development create ideal opportunities for Anderson, especially if green space is incorporated in the overall design of the new development. Research shows the presence of recreation and natural spaces is the number one influencing factor in deciding the location of businesses (DeSousa, 165). Live, work, and play developments will increase the city’s population, address housing needs, create jobs, and boost the overall economy.

Major ecological and environmental roles that brownfields-to-green space projects play include: enhancing biological diversity, improving water quality, cleansing air, soils, and sediments, recharging natural aquifers, and controlling floods (DeSousa, 166). Remediation technologies for brownfields redevelopment help achieve these environmental goals by breaking down organic wastes from soil and water, managing pollutants in the air, and establishing a lush natural environment. As of today the city is viewed as one large eyesore; it seems as though you can see a vacant building or site everywhere you look. With the emergence of Anderson’s new, green landscapes, a new aesthetic identity will be given to the city while each landscape benefits ecologically and environmentally.

Environmental benefits of brownfields extend beyond just ecological and environmental, in regards to the natural environment, reaching out to social and health aspects of Anderson. Remediating contaminated sites eliminates health and safety hazards, for both the environment and residents, and encourages people to interact with one another. Nature in cities has the ability to encourage activity in outdoor spaces, which increase social integration, interaction among neighbors, and strengthens social ties within communities (DeSousa, 164). The urban greening of Anderson will not only benefit the economy and environment, but it will also benefit public and natural health and social integration within the city.

problem statement

This study will look at the urban revitalization of three General Motors brownfields in Anderson, Indiana to reconnect the city with these spaces. Understanding specific brownfield site concerns and successful urban spaces will be essential to transform these spaces into urban corridors. Finally, sustainable design strategies will be used to produce an urban corridor master plan for Anderson's GM brownfield.

[Hypothesis]

Revitalizing these brownfields to urban spaces and corridors will help boost Anderson's economy and be beneficial to the environment in order to reconnect these spaces with the city.

The revitalization of these three brownfields will encourage future redevelopment and revitalization of Anderson's remaining brownfields.

[Delimitations]

This study will not include sources of funding.

Redevelopment strategies will include environmental revitalization, however, detailed cleanup and chemical treatment will not be included.

Unless noted otherwise, vacant buildings on the brownfield sites will be demolished.

This study will not address urban corridor redevelopment beyond the specified brownfields.

This study will not include gathering public input from the whole of Anderson to determine public goals.

[Assumptions]

Harmful site matter will be cleaned and remediated before moving forward with development.

The design elements for each brownfield site will follow all requirements of ADA guidelines.

The transformation of these brownfields will enhance the area and overall community aesthetic.

Revitalizing General Motors brownfields will not only help the economy and environment, it will maintain city character, history, and high levels of community usage.

project significance

Towns and cities across the U.S. have experienced deindustrialization resulting in unused brownfield sites. Deindustrialization has also left holes in national and local economies and environments. With major factory buildings and industrial lands scattered across cities it creates a bad image for potential community members and businesses as well as those who already reside in these places. With Anderson being the focus of this study, it is a city littered with brownfields and abandoned industrial sites.

Sustainable revitalization practices need to be approached in order to urbanize these areas and reconnect derelict spaces with the city. This will not only be better for the environment but also for Anderson's economy. Since the majority of cities lack sustainable pedestrian zones, revitalized urban spaces within Anderson can act as a destination point on a local level and a national scale.

The overall role of deindustrialization has taken an unworthy toll. In order to rebuild our cities we must start with the simple revitalization of industrial brownfields. It only takes one city to start the process and successful design strategies and implementation could pave the way for a nationwide revitalization. Anderson can very well be the city which jump starts the brownfields redevelopment incentive. Successful brownfields transformations will celebrate community character, history, and encourage future development.

project requirements

The mission of this project is to redevelop Anderson's General Motors brownfields and utilize sustainable revitalization strategies into an urban corridor master plan for the city of Anderson, Indiana. The redevelopment of these brownfields will reconnect these abandoned lands to surrounding communities and the city as a whole, implement sustainable strategies to provide a self-sufficient landscape, and provide benefits to Anderson's public health, environmental health, and economic health. The following goals and objectives have been developed for this revitalization effort:

[Revitalization of the City of Anderson]

- Objective 1: Examine plant histories, products, and current uses as of today.
- Objective 2: Redevelop brownfields to cleanse contaminants and benefit the natural environment.
- Objective 3: Transform each site into an appealing urban space that will reconnect the brownfields to its context and city.
- Objective 4: Boost the economy by creating jobs in remediating and redeveloping Anderson's brownfields.

[Implement clean-up strategies for each site]

- Objective 1: Based on each plant's manufactured product line and contamination research, determine each brownfield's potential contamination.
- Objective 2: Implement multiple remediation technologies.

[Incorporate sustainable development technologies]

- Objective 1: Review case studies similar in size and type according to each GM brownfield and what they will become.
- Objective 2: Incorporate successful design concepts from case studies to the design of Anderson's brownfields.
- Objective 3: Implement sustainable practices concepts of green urbanism and biological remediation from case studies and remediation research.

program

The program of this project focuses on four design points for the revitalization of Anderson's General Motors brownfields. These points, along with goals and objectives, provide guidelines for the design. The program includes: sustainable mobility, urban metabolism, scale, connections and linkages, and sustainability, demonstration, and experimentation.

[*Sustainable Mobility*]

Address transportation problems using a package of initiatives that ultimately reduce the need and reliance of the automobile.

Distinguish a cohesive circulation system to balance access, mobility, and movement throughout the site.

Encourage pedestrian priority throughout entire site while focusing on the ultimate reduction of non-essential roadway infrastructure.



Figure 3.1: Bicycle rack in Amsterdam, Netherlands.

[Urban Metabolism]

The city as an organic whole: the design understands and sees the city as a living environment that balances Anderson's environmental inputs and outputs.

Establish a balance in natural versus built systems in a symbiotic habit.



Figure 3.2: Futuristic bio-city grows vines to eliminate pollution.

[*Scale, Connnections, Linkages*]

Illustrate creative attention at each scale allowing for the establishment of spatial connections and to encourage attention to detail.

Reconnect the brownfield sites to their immediate context as well as the city of Anderson.

Produce appropriate human scales in all aspects of the design by using a network of systems.



Figure 3.3: Boardwalk leading from the town of Dungeness to the English Channel.

[Sustainability, Demonstration, and Experimentation]

Implement design incentives and programs that emphasize sustainable development, which would allow for projects to at least pay themselves off in the long term.

Set new directions for green development by continuously experimenting with new ideas, tools, and strategies.

Experiment and demonstrate unique design through vibrant and impactful installations, architecture, landforms, and sculpture.



Figure 3.4: Freely stretching art installation in Sydney, Australia.



design process

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conceptual masterplan	56
masterplan	58
feel	62
technical	78

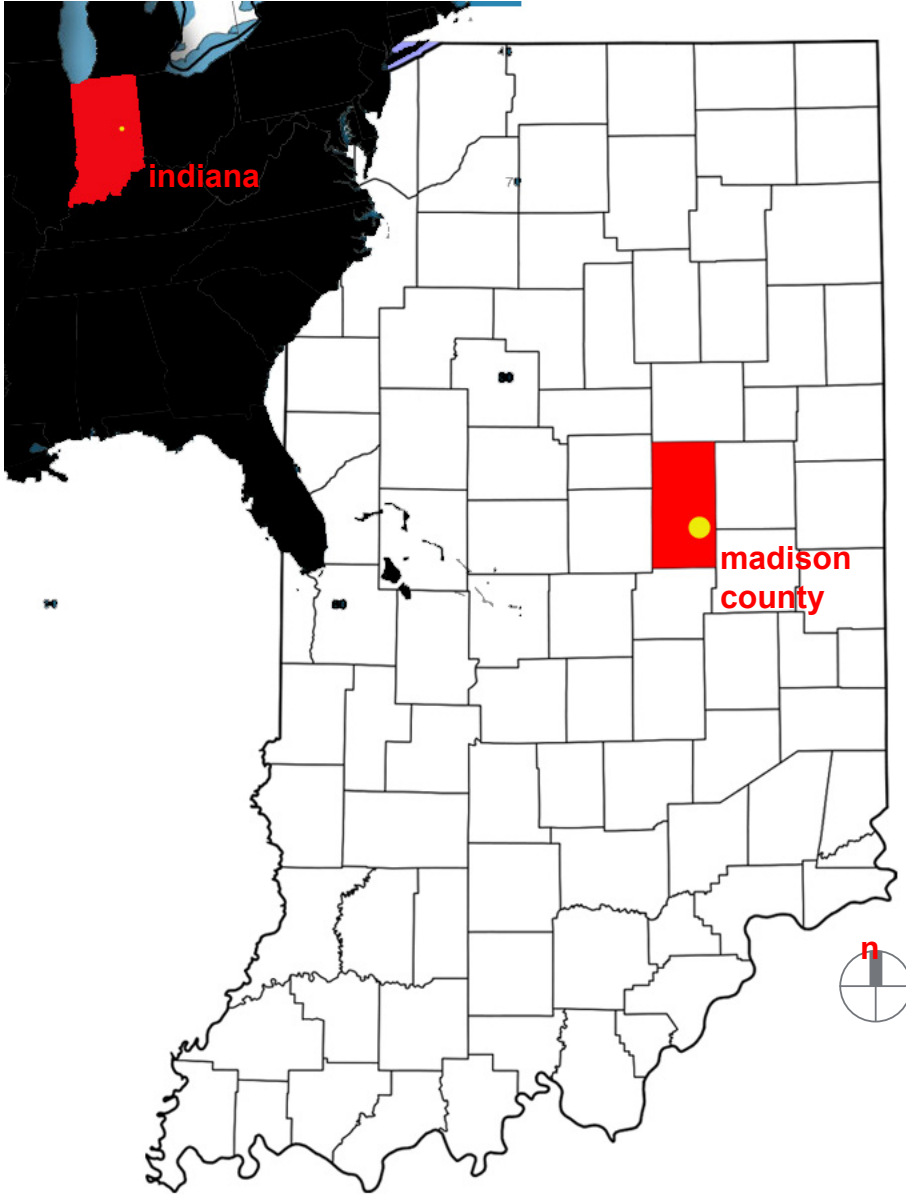


Figure 4.1: Specific site location within Indiana.

With a population peaking just above 6.1 million, Indiana is located in the Midwestern United States and Great Lakes Region. Extending just northeast of Indianapolis, Anderson lies in Madison County and is the principal city within the county. Being the principal city of the county Anderson plays an important role as county seat.

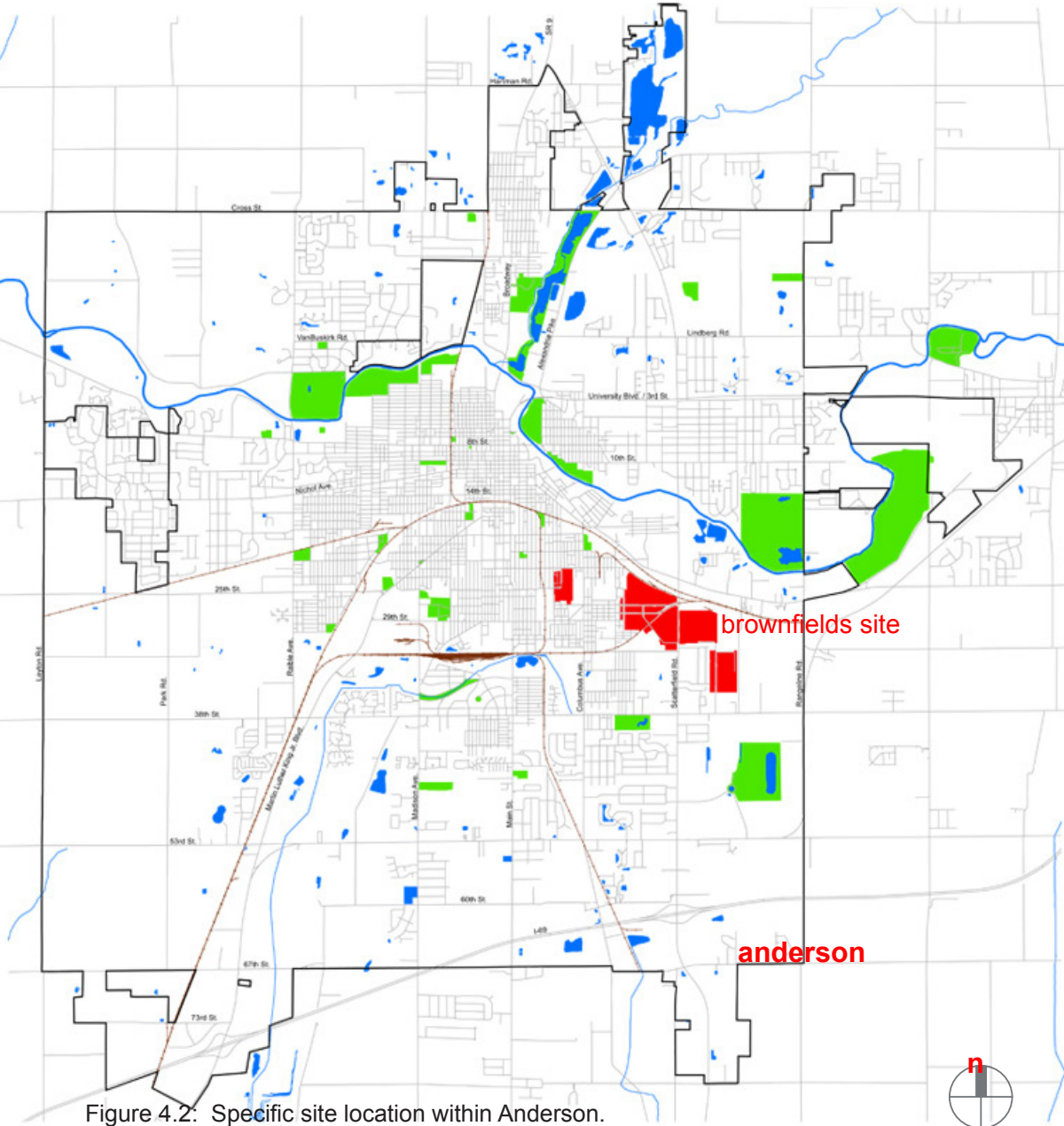


Figure 4.2: Specific site location within Anderson.

According to a 2009 census pole, Anderson has a current population of 57,189. The specified General Motors brownfields site is located in the east central portion of the city. Land comparisons demonstrate the 263 acres of the site versus the 800 total acres of city-owned green space in the city.

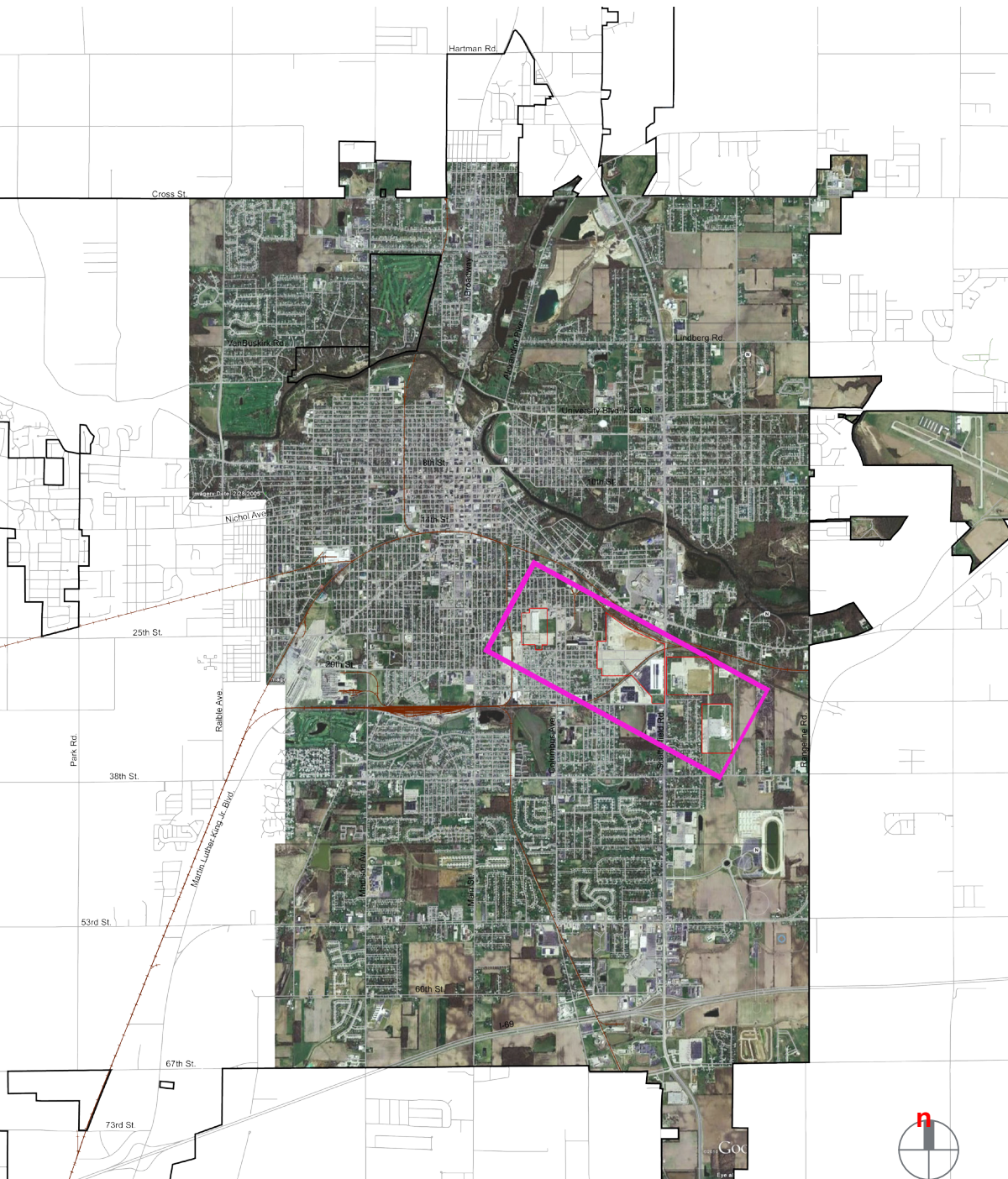


Figure 4.3: Site location within existing context.

The surrounding context of the site varies between green spaces, residential, and higher density developments including commercial and municipal developments. However, the majority of the site's context is residential, non-park green spaces, and agricultural fields.

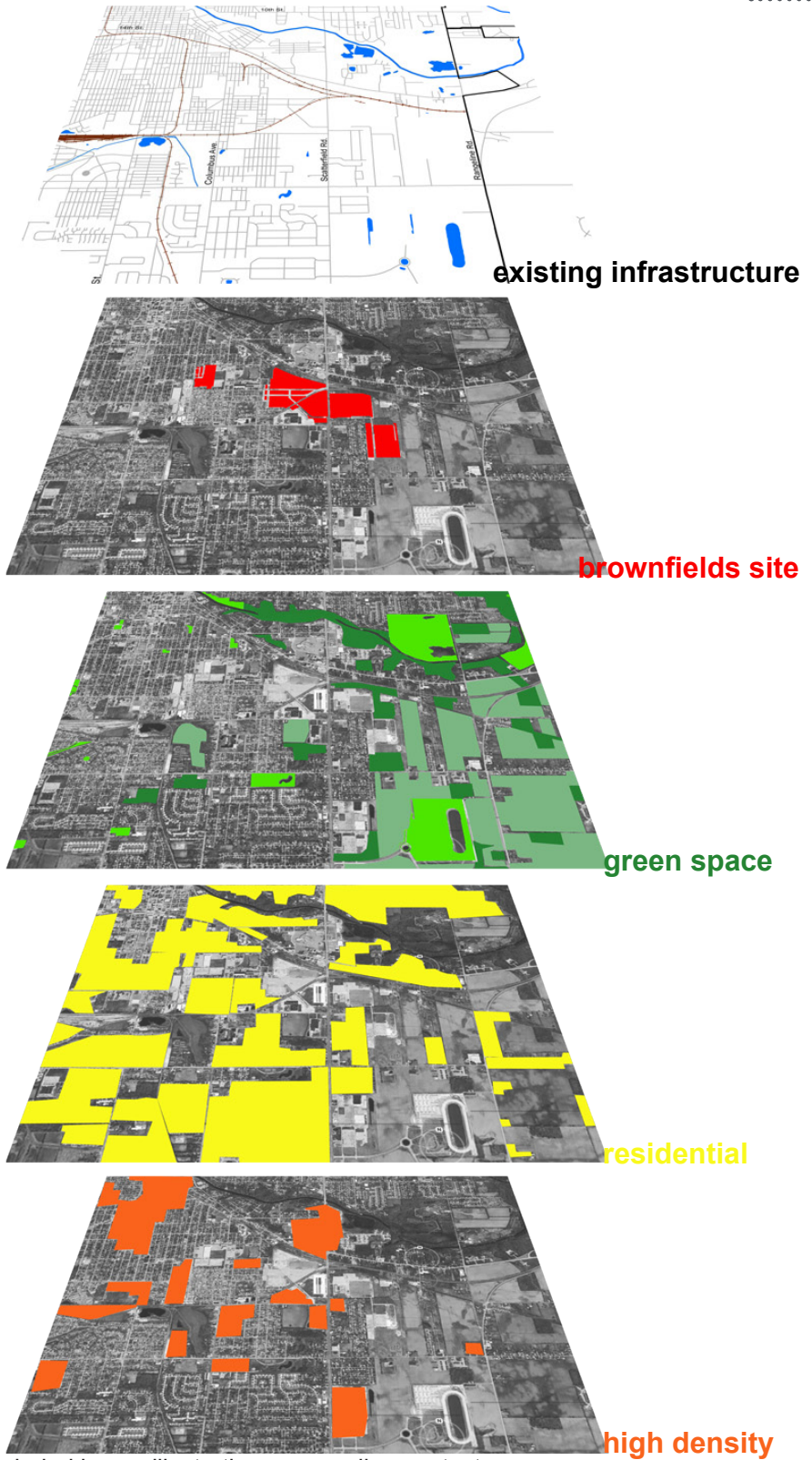


Figure 4.4: Exploded layers illustrating surrounding context.

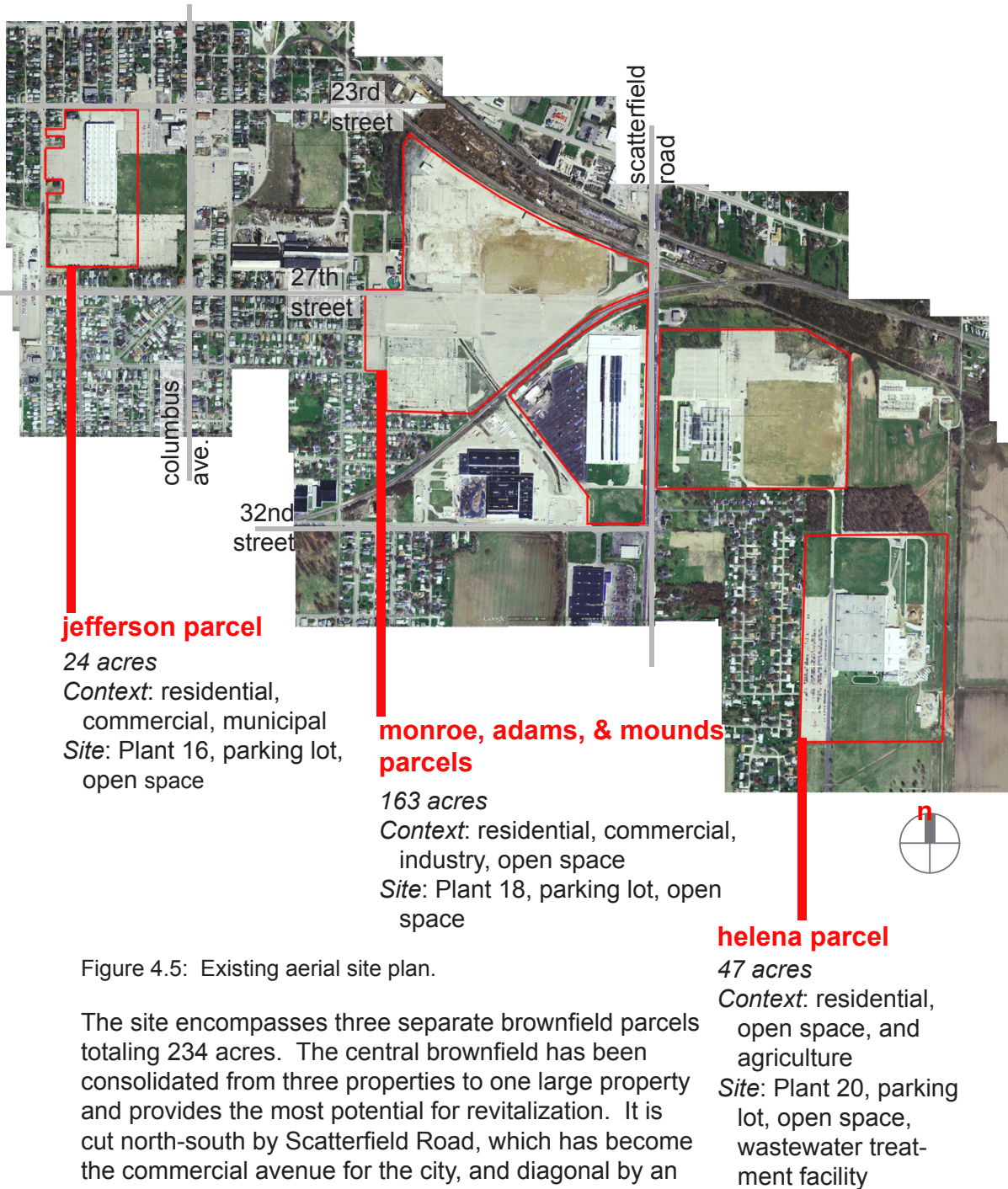


Figure 4.5: Existing aerial site plan.

The site encompasses three separate brownfield parcels totaling 234 acres. The central brownfield has been consolidated from three properties to one large property and provides the most potential for revitalization. It is cut north-south by Scatterfield Road, which has become the commercial avenue for the city, and diagonal by an existing railway. The brownfields have minimal topographical change creating a number of site lines and include one abandoned structure per property.

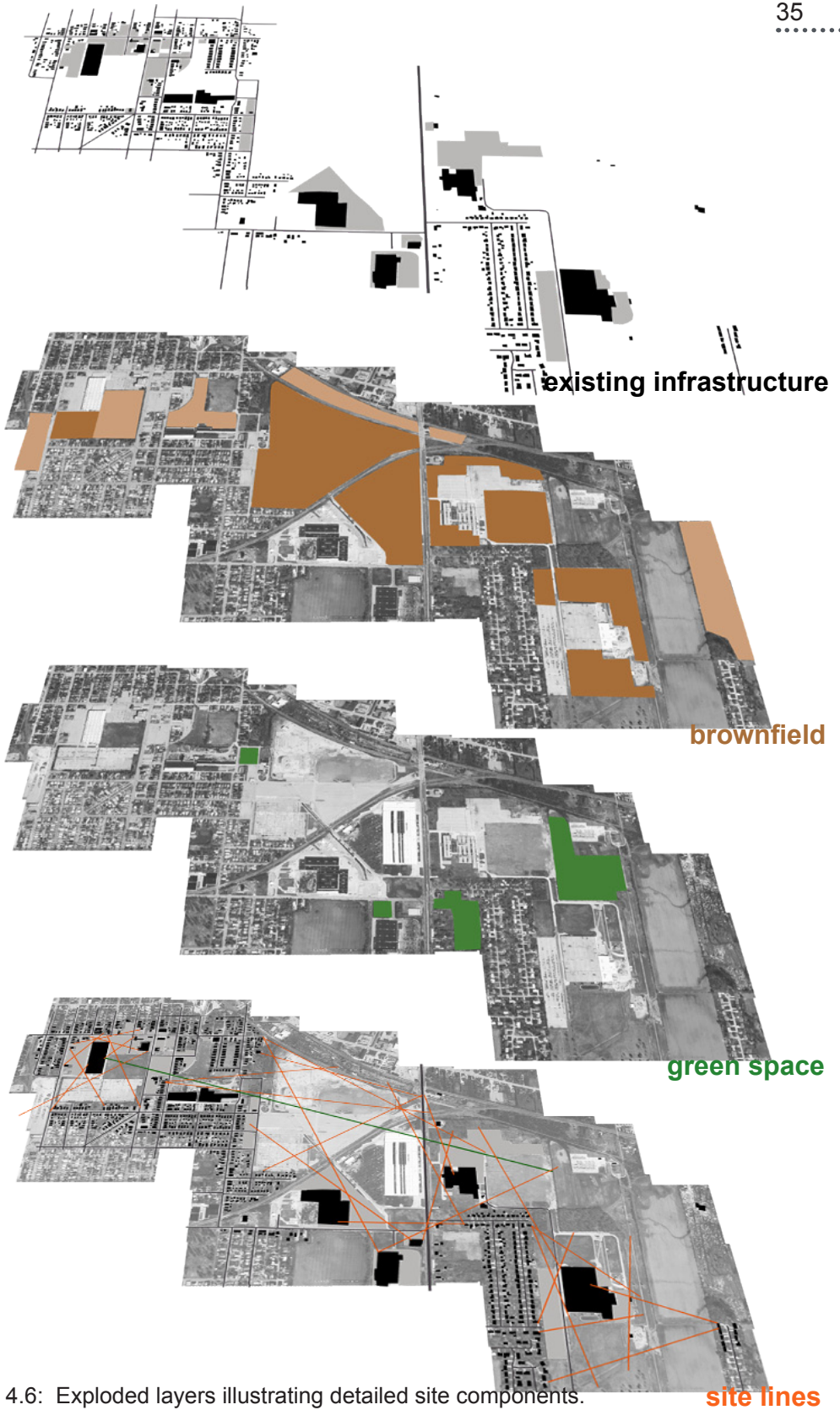


Figure 4.6: Exploded layers illustrating detailed site components.

site lines



Figure 4.7: Panoramic view of the Jefferson Parcel.



Figure 4.8: Panoramic view of Plant 18 and its adjacent property.



Figure 4.9: Panoramic view of Monroe, Adams, and Mounds Parcels.



Figure 4.10: Panoramic view of the Helena Parcel.



Figure 4.11: View of abandoned Plant 16.

existing site imagery

Existing site imagery illustrates abandonment, city eyesores, and fenced off properties not accessible to the public.



Figure 4.12: View of abandoned Plant 18.



Figure 4.13: View of abandoned Plant 20.

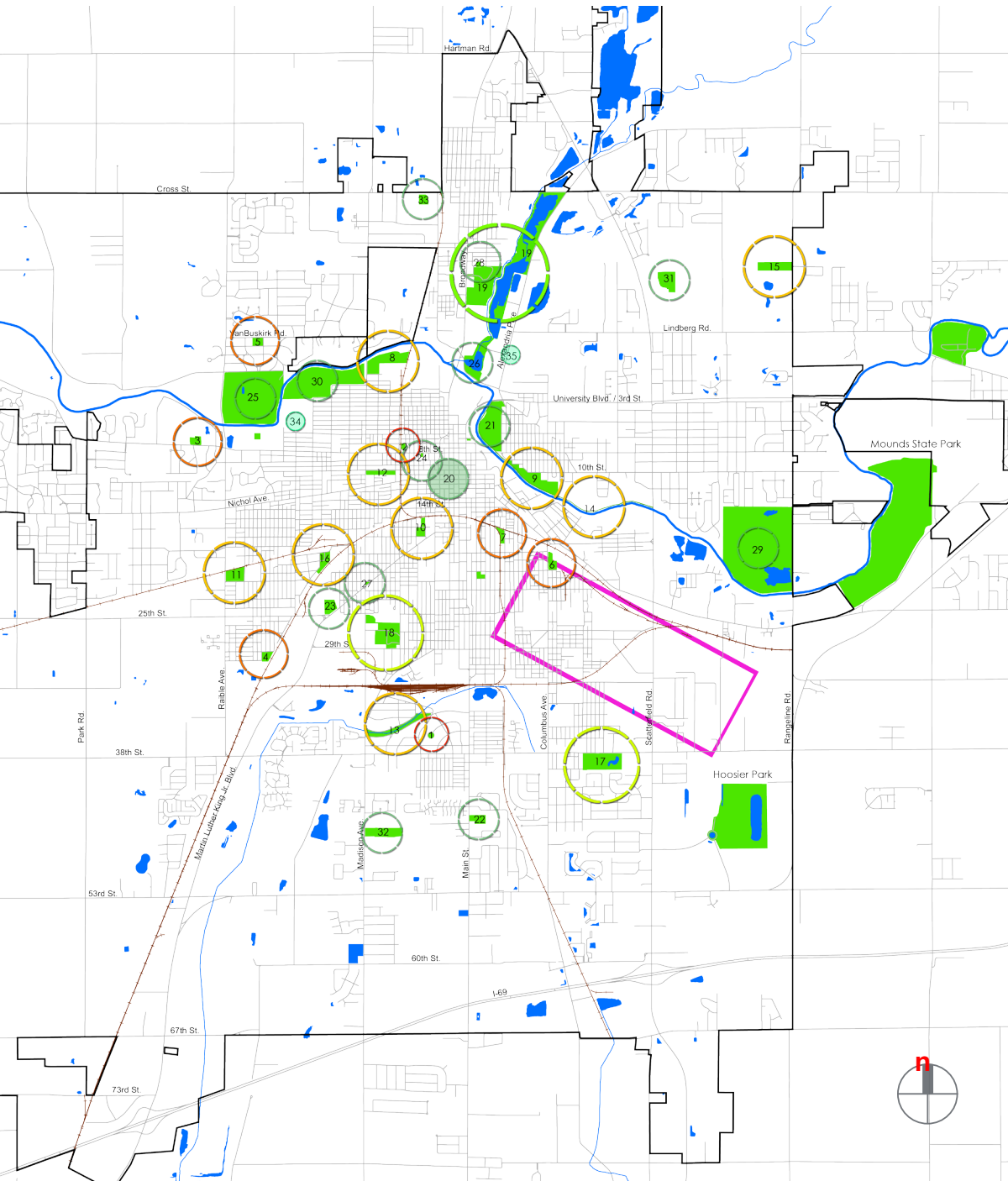


Figure 4.14: Map illustrating city-owned green spaces in relation to site.

An essential aspect to creating a successful design is careful determination of connections and linkages to surrounding context. This portion of the analysis highlights every city-owned park space in relation to the site and begins to illustrate green development opportunities.

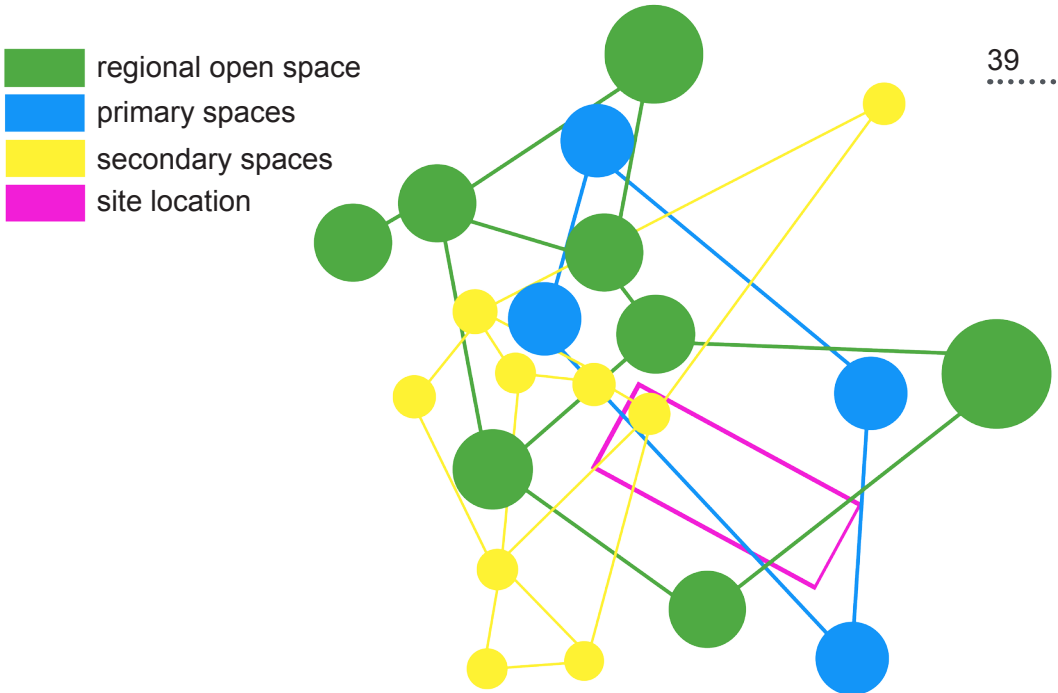


Figure 4.15: Spatial diagram of green context in relation to site.

Figure 4.15 demonstrates how surrounding green spaces connect with one another according to park size and use. Regional open spaces focus on large, natural parks whereas secondary spaces focus on small, urban parks. In any matter, this figure illustrates a lack of park density and connections through the site. Below, figure 4.16 shows a ten minute walking radius from major green space surrounding the site.

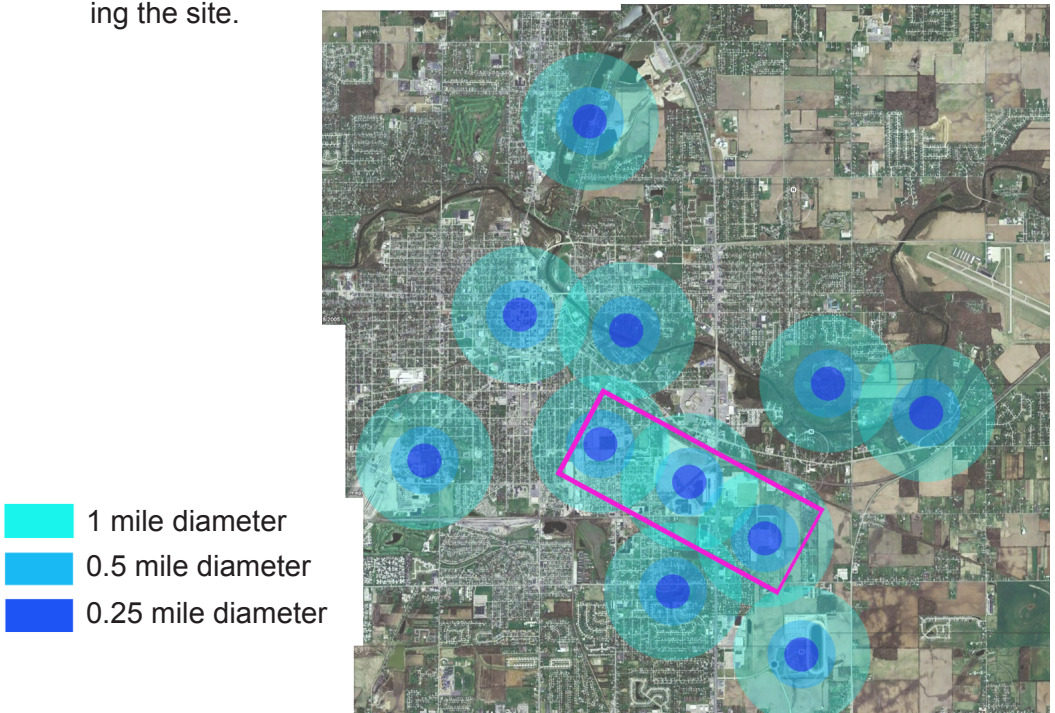


Figure 4.16: Walking distances from major green spaces.

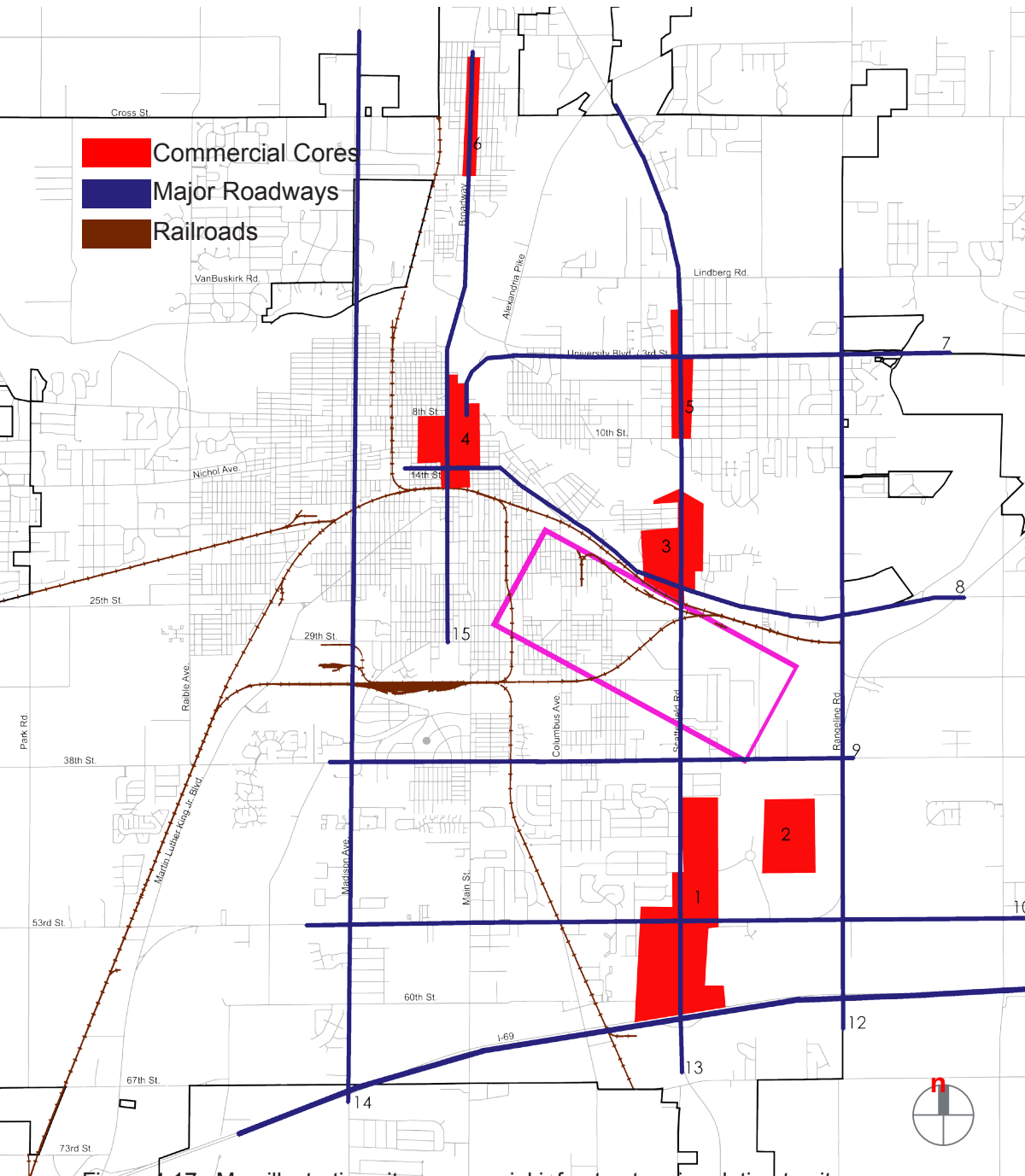


Figure 4.17: Map illustrating city commercial infrastructure in relation to site.

An important question is simply can this project sustain new development? As a landscape architecture student it seems given to justify connections to surrounding green spaces. On the other hand and in the eyes of potential developers, a key aspect to revitalization lies in the connections to existing infrastructures.

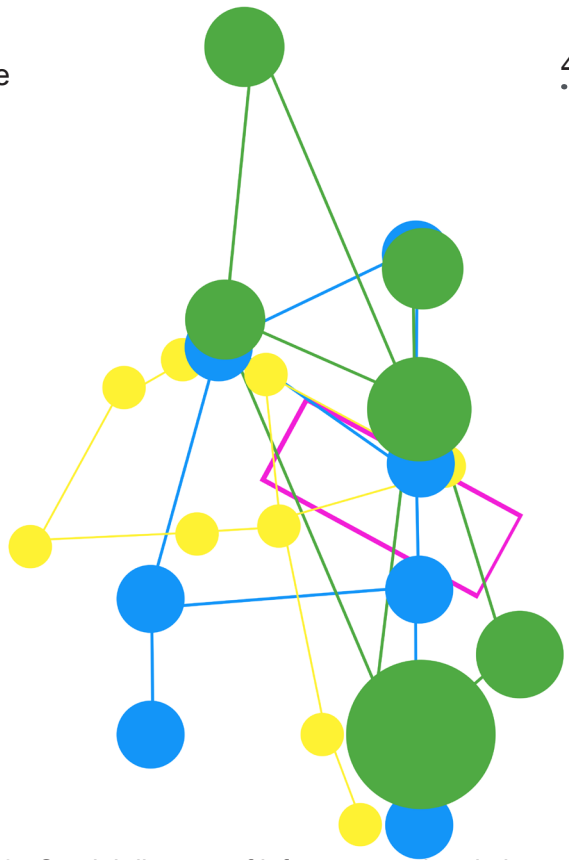
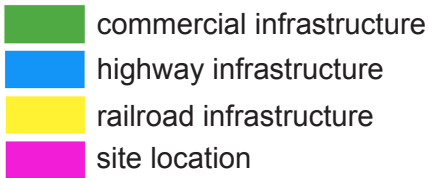


Figure 4.18: Spatial diagram of infrastructure in relation to site.

Figure 4.18 demonstrates how surrounding infrastructures connect in terms of commercial zones, major roadways, and railroads. Opposite of surrounding green spaces, existing infrastructures densely populate the site's surrounding making it centrally located to key points. The figure below illustrates a ten minute walking radius from important infrastructure zones around the site.

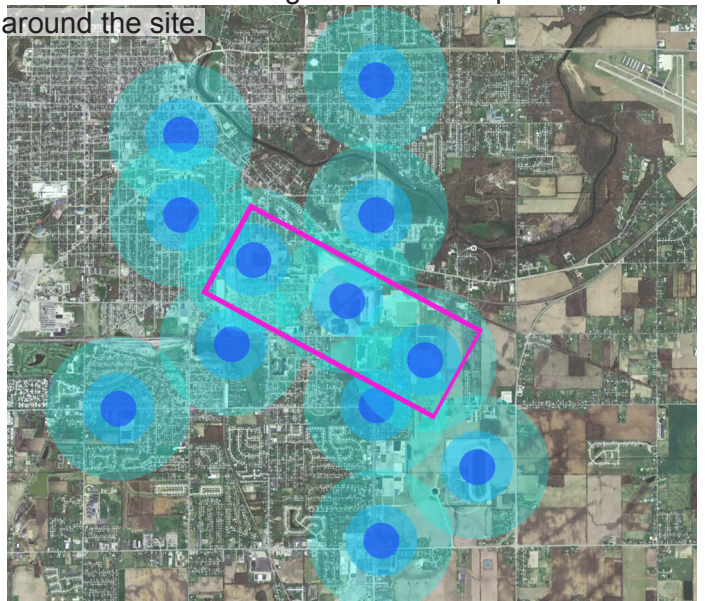
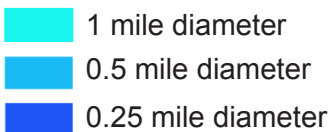


Figure 4.19: Walking distances from major infrastructure.

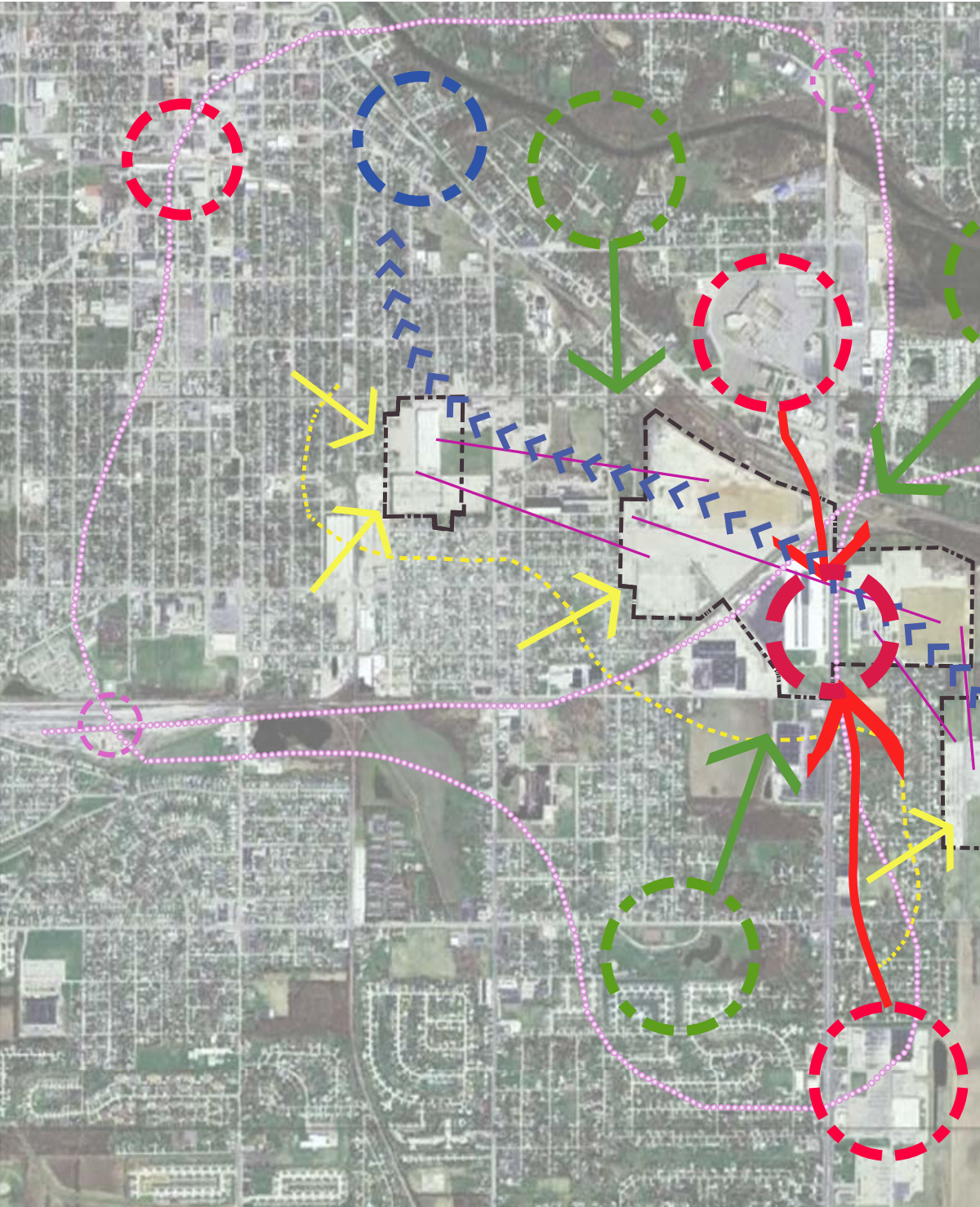
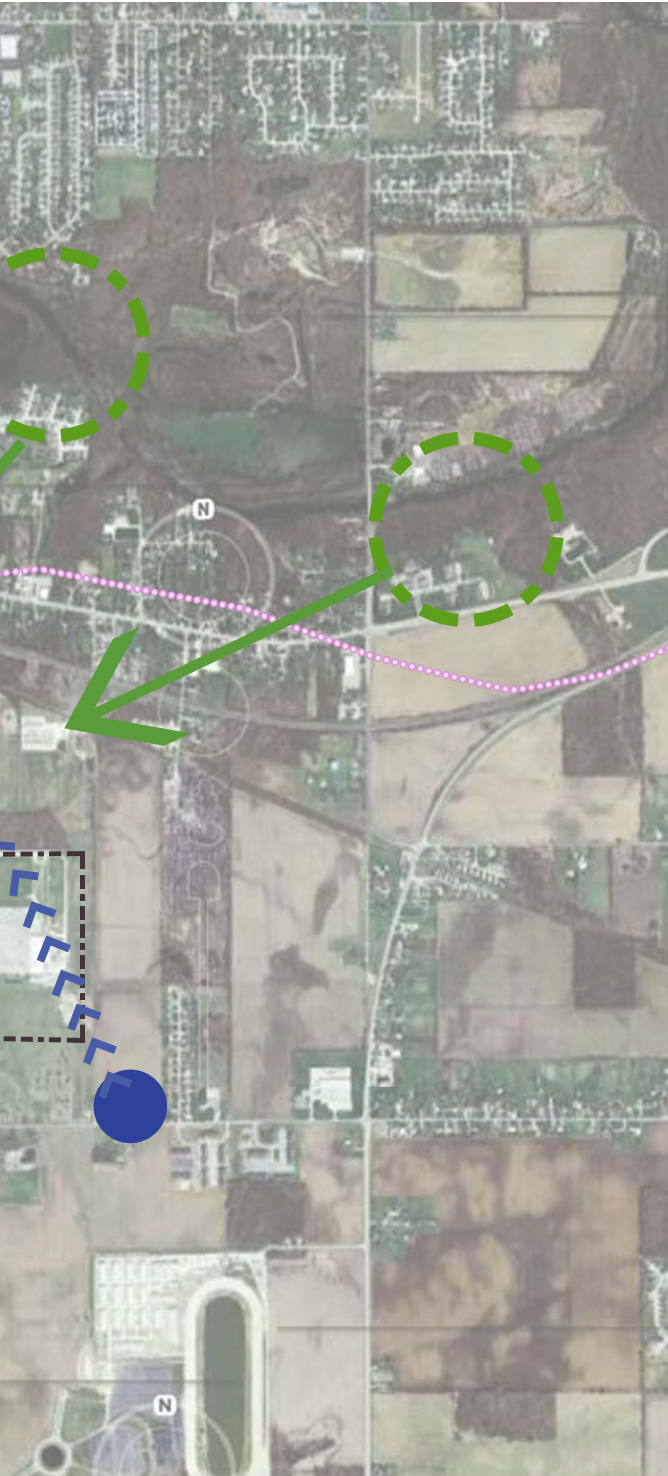


Figure 4.20: Analytical diagram of site opportunities.

opportunities

This diagram portrays design opportunities based upon existing inventory and analysis layers. The site presents many great opportunities for revitalization and redevelopment as it will be highly beneficial in providing new strengths to Anderson. The colored numbers below coordinate with specific colors on the diagram and state available opportunities.

- 1** gateway hub to the city:
commercial + environment +
transportation
- 2** utilize existing rail lines for
alternative transit
- 3** introduce water systems to
connect all sites and give
direction to white river
- 4** green corridors and pedestrian
systems from adjacent
green spaces
- 5** provide connections to
immediate residential
communities
- 6** create viewshed corridors
and off-site linkages through
strategic introduction of topography
- 7** potential for a consumer link
between commercial zones



conceptual matrix

Conceptual development began with the creation of a photographic matrix of conceptual components. Strategic development words and photography offer inspiration outside of precedent studies and competing ideas. The rows use four 'big idea' words of brownfield revitalization while the columns directly relate to what will be impacted and how the site will be designed. Specifically, the first two columns (culture + ecology) describe what will be impacted on the site whereas the last three columns (element + material + descriptor) describe how the site will be designed. The images within each cell are described by the words under each image. The matrix provided four concepts: redevelop, reconnect, remediate, and identity.

An important note to keep in mind when continuing to the concepts; the initial sets of diagrams were established as a laying process using key words from this photographic matrix and from specific program points.

culture + ecology



gy → element + material + descriptor



Figure 5.1: Photography matrix of conceptual components.

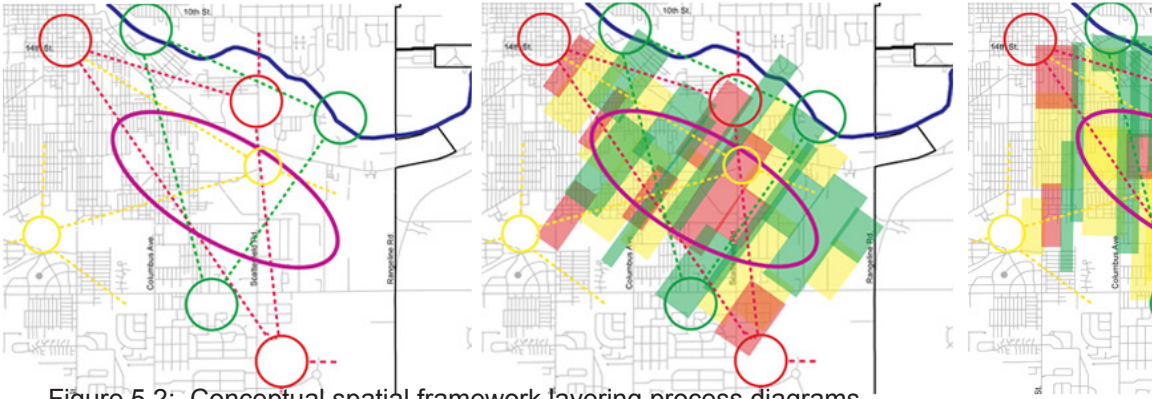


Figure 5.2: Conceptual spatial framework layering process diagrams.

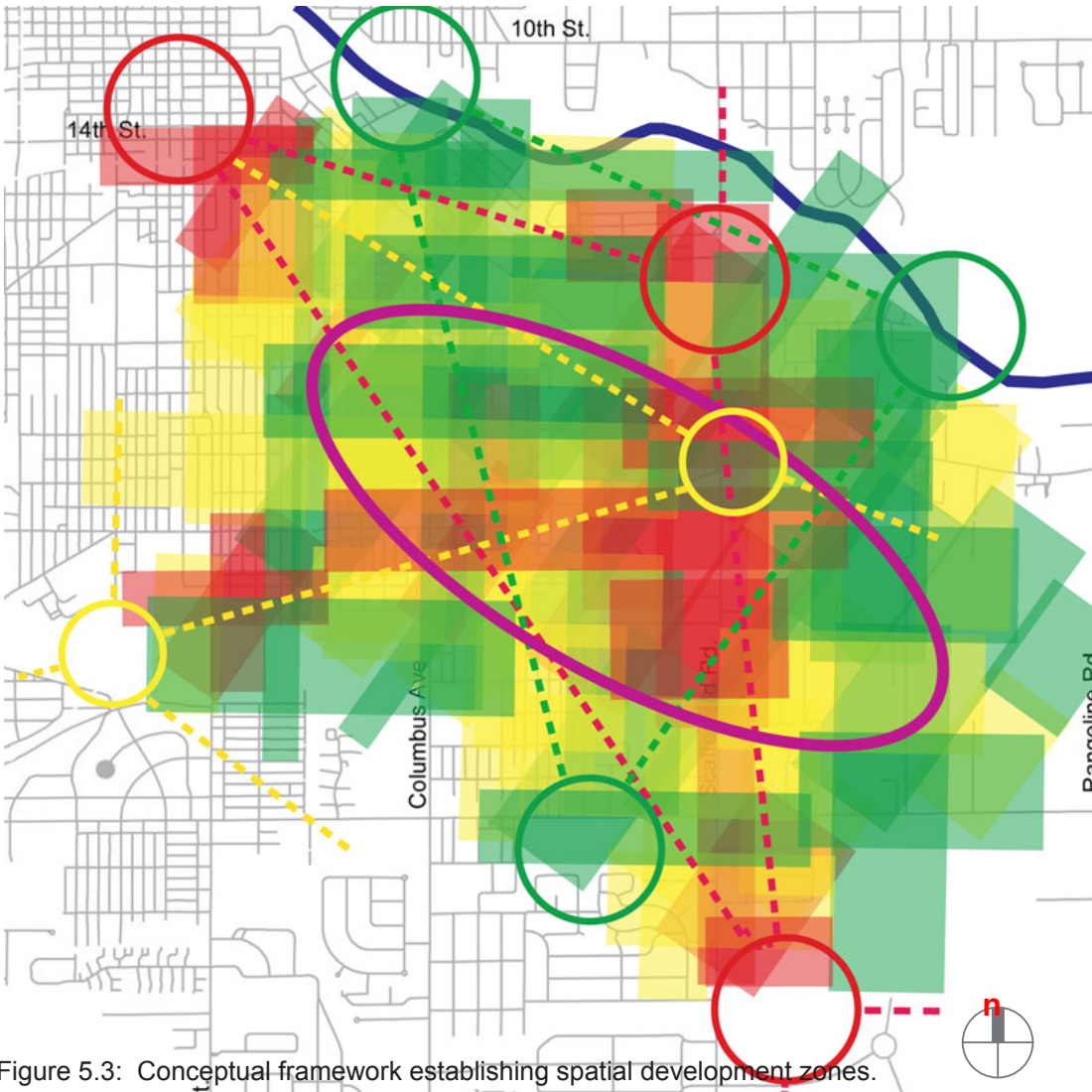
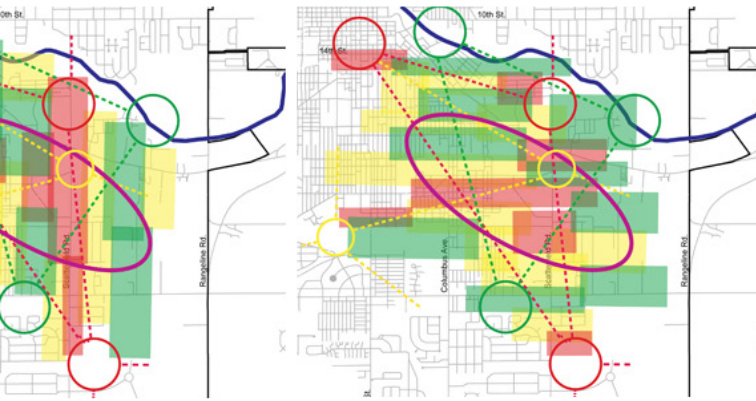



Figure 5.3: Conceptual framework establishing spatial development zones.



-  primary green spaces
-  primary commercial zones
-  major transportation intersections
-  site location
-  zones for green space development
-  zones for high density development
-  zones for low density development
-  green connections
-  commercial connections
-  transportation connections

conceptual framework

Following the photographic concept matrix, the next step in conceptual design established a conceptual framework. This framework provided ideal spatial development zones based on the inventory and analysis studies. The layering process included connections to major adjacent points and spatial processing using north-south, east-west, and diagonal axes. All layers were then combined to form a base for zone densities and spatial designation.

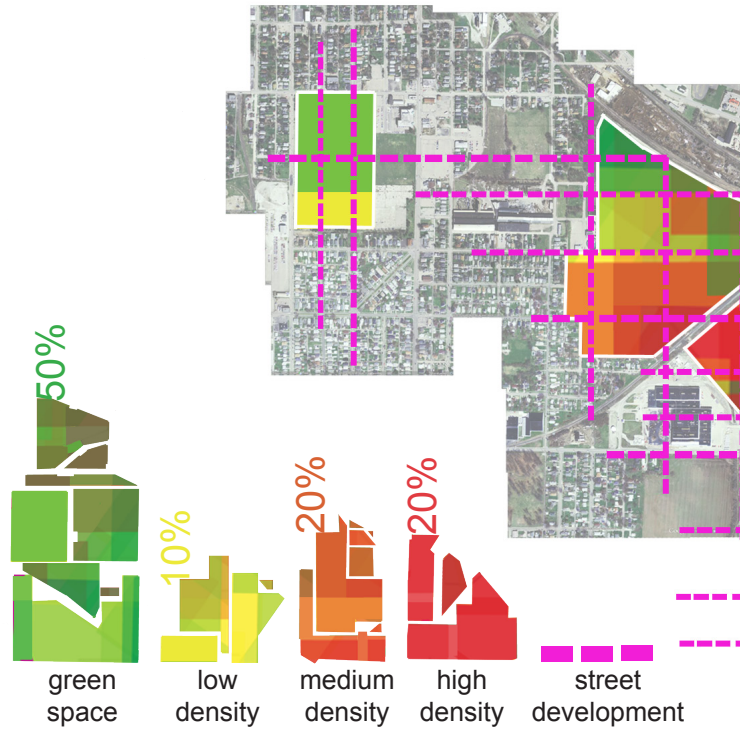
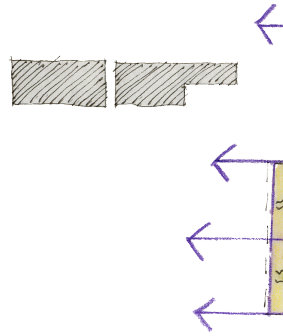
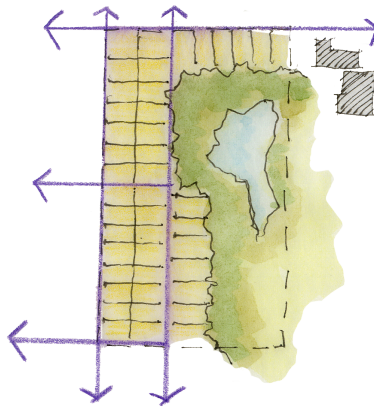
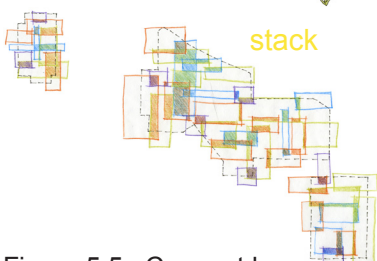
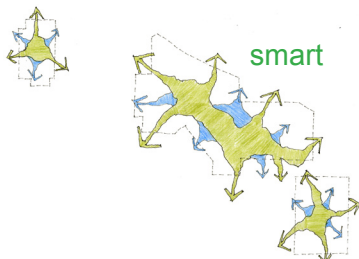
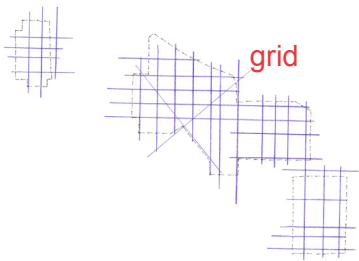
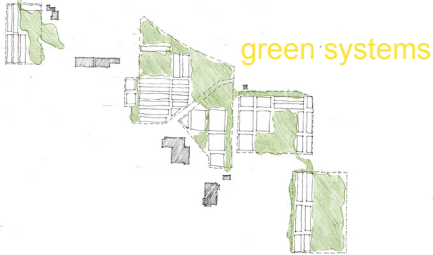
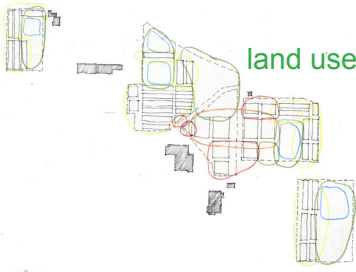
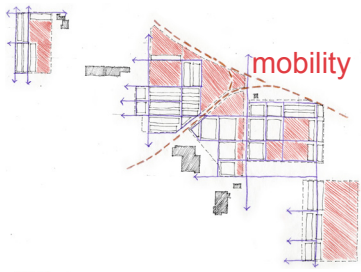


Figure 5.5: Concept layers.

Figure 5.6: Spatial density percentages and plan.

concept: redevelop

The **approach** of this concept followed the ideas of:

- _redeveloping residential identities*
- _maintaining the functional and traditional city grid*
- _keeping primary focus on residential developments*
- _utilizing all existing infrastructures including the rail line*
- _introducing layered vegetation systems to cleanse as well as add aesthetic appeal*

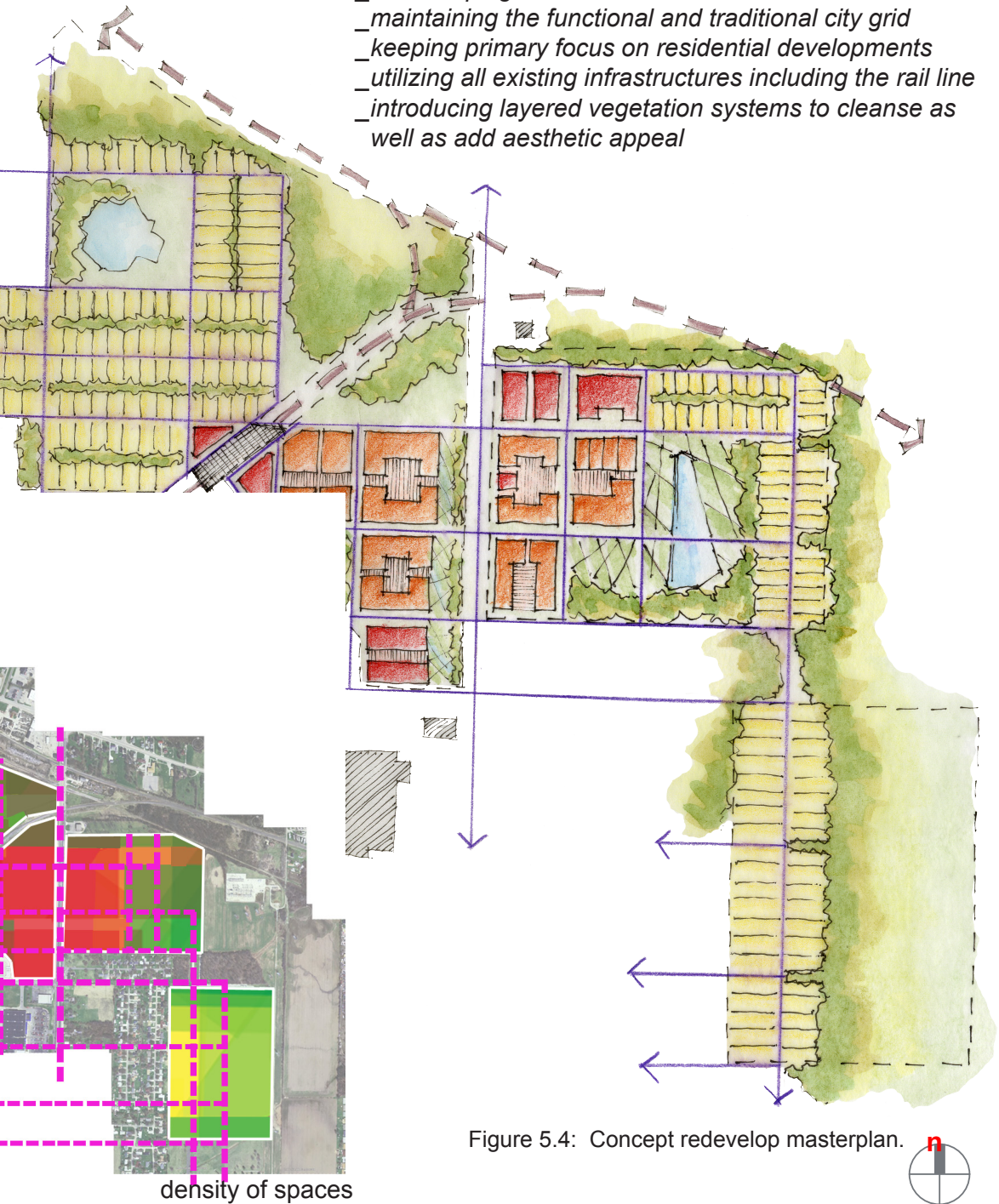


Figure 5.4: Concept redevelop masterplan.



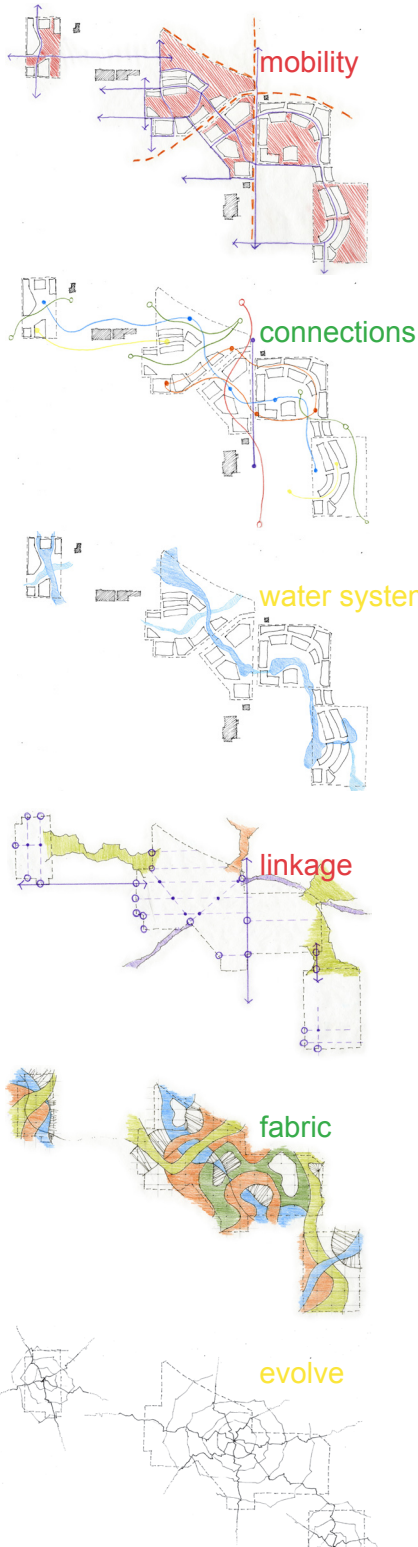


Figure 5.8: Concept layers.

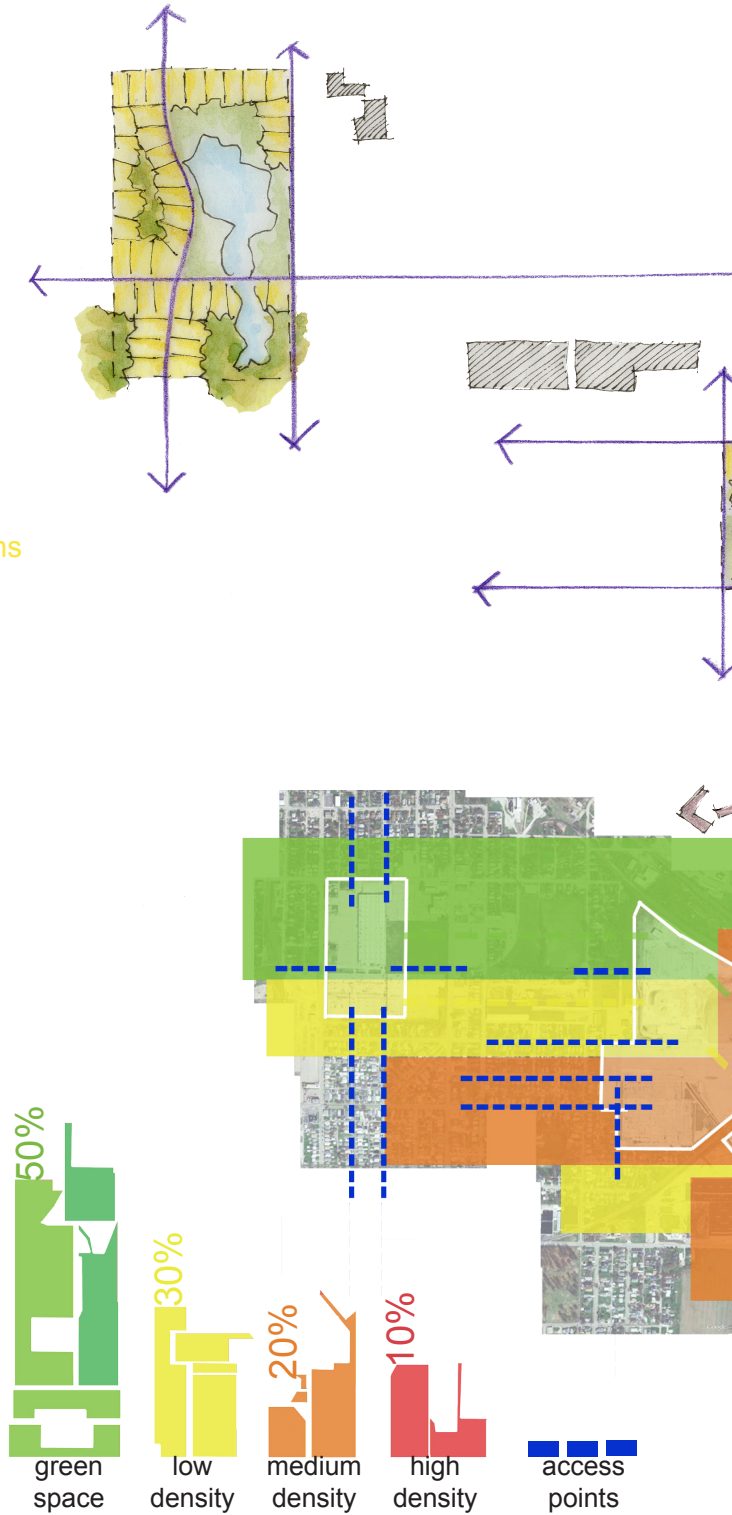


Figure 5.9: Spatial density percentages and plan.

concept: reconnect

The **approach** of this concept followed the ideas of:

- _reconnecting site to immediate surrounding developments
- _creating a development fabric to unify spaces
- _developing site entry points to propel movement
- _incorporating rail transit development
- _allocating sufficient amounts of natural water systems and environments



Figure 5.7: Concept reconnect masterplan.



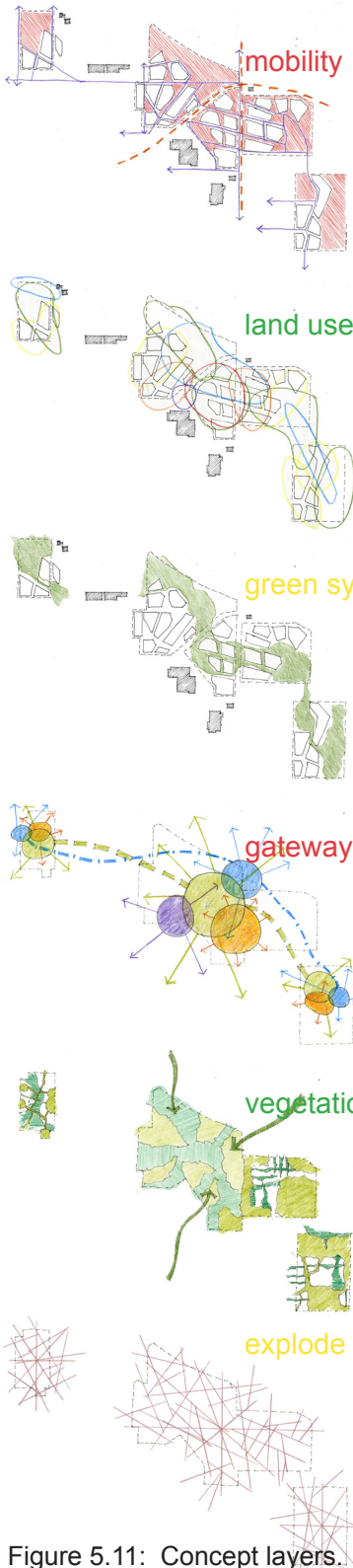


Figure 5.11: Concept layers.

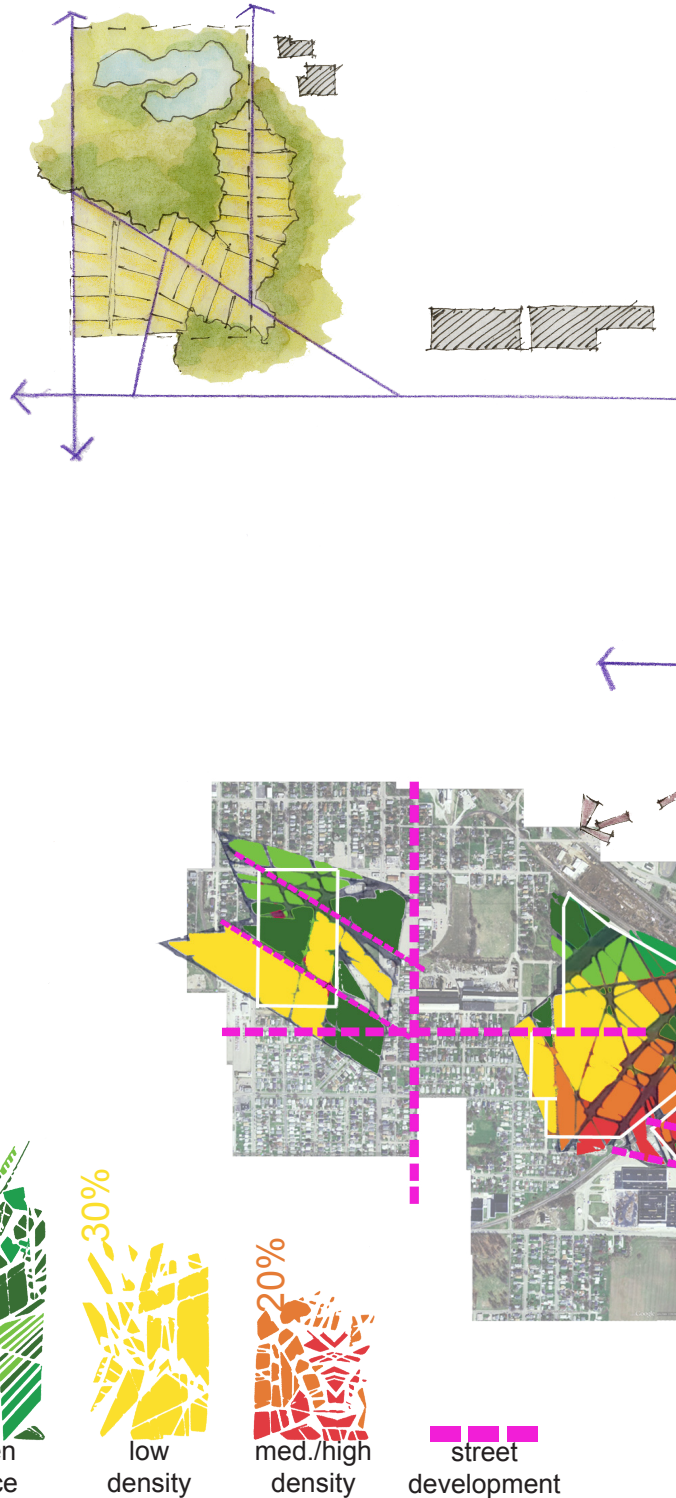


Figure 5.12: Spatial density percentages and plan.

concept: remediate

The **approach** of this concept followed the ideas of:

- _remediating both form and function of the built and natural environments*
- _providing a balance between low, medium, and high density developments*
- _creating pedestrian dominated spaces and corridors*
- _utilizing a non-traditional layout program*
- _designing a gateway to function as city hub with light rail transit*



Figure 5.10: Concept remediate masterplan.



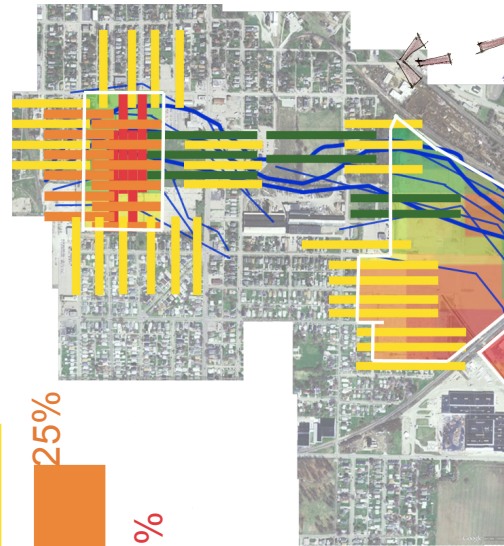
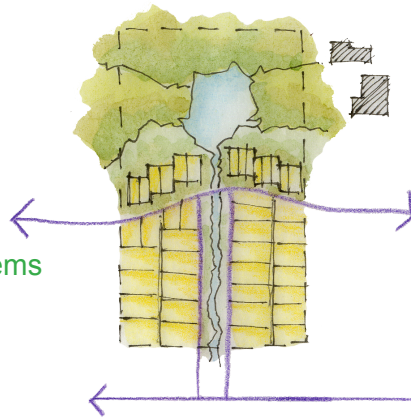
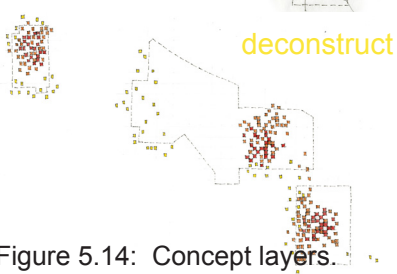
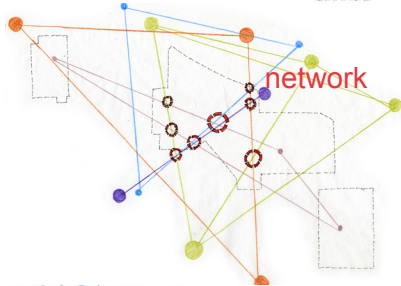
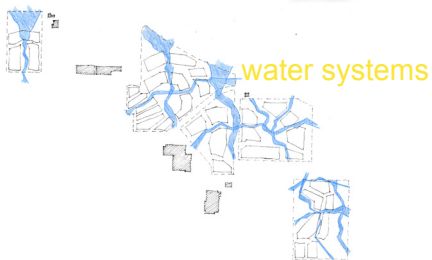
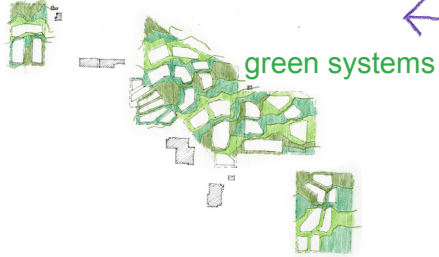
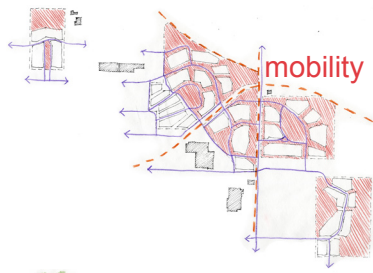


Figure 5.14: Concept layers.

Figure 5.15: Spatial density percentages and plan.

concept: identity

The **approach** of this concept followed the ideas of:

- _establishing a unique identity relatable to the whole city
- _incorporating landforms and topography inspired from natural systems
- _reusing and recycling General Motors abandoned building materials
- _celebrating rail line as a network axis for the site and its surroundings
- _allowing the natural landscapes to influence spatial design of the entire site

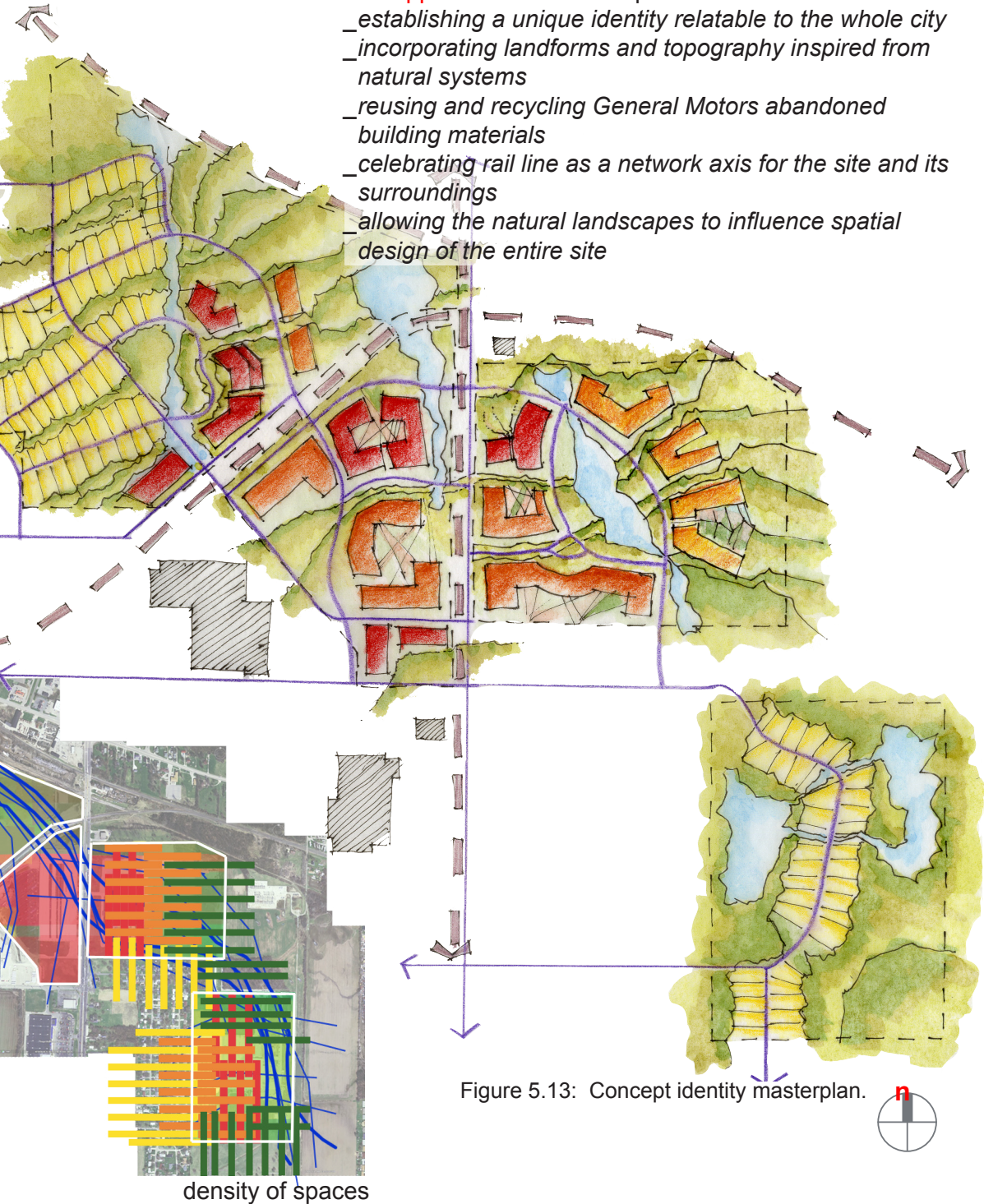


Figure 5.13: Concept identity masterplan.



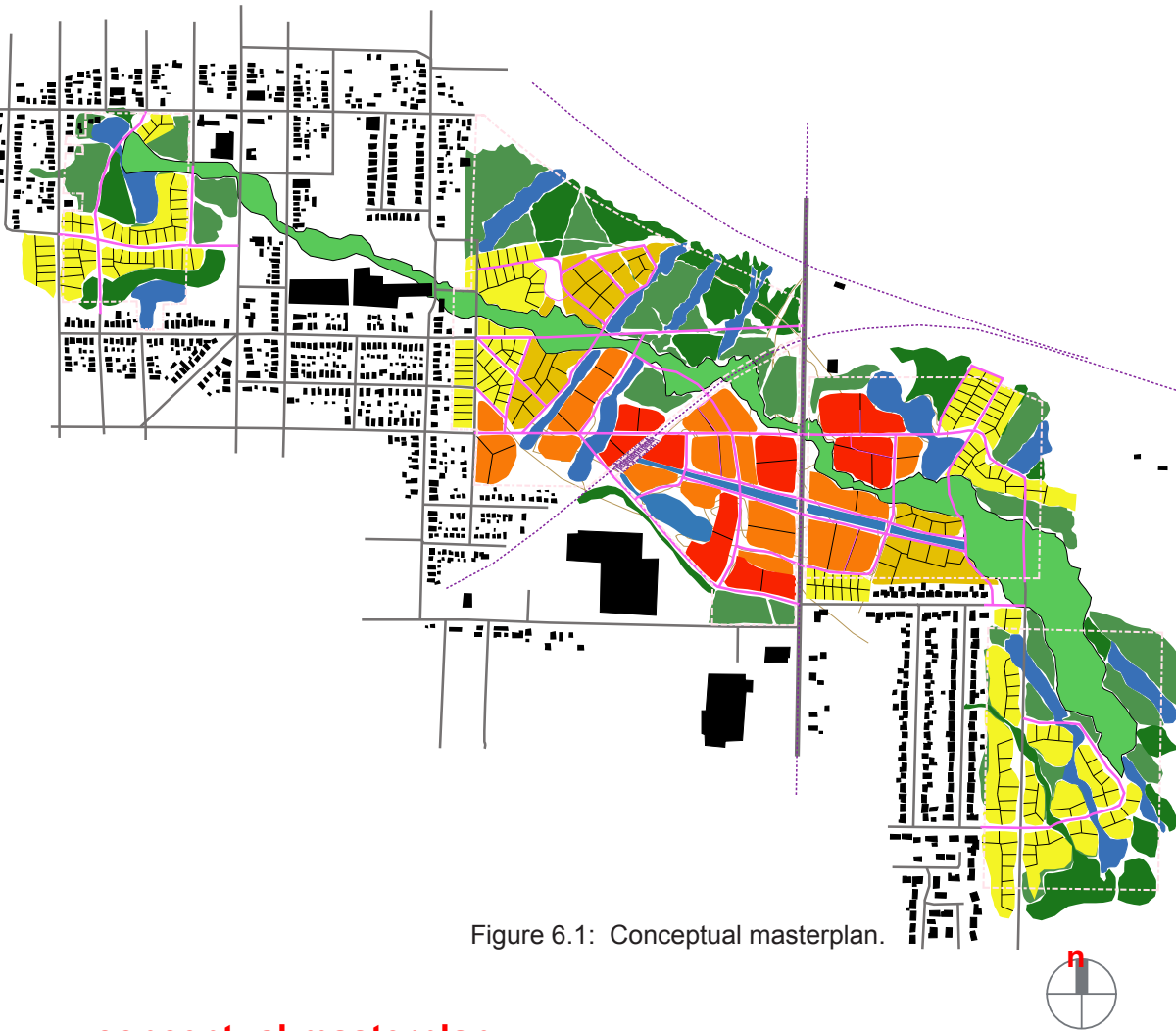


Figure 6.1: Conceptual masterplan.

conceptual masterplan

The conceptual masterplan combines layers and approach points from all four concept plans. Celebrating the existing railway, light rail alternative transportation provides an axis for development and encourages sustainable mobility. The plan establishes a harmonic balance of natural systems within the natural and built environments. It connects to immediate surroundings and provides a linkage to all sites via a green corridor. In order to lower the impact of vehicular access, the conceptual masterplan creates a vision for a pedestrian dominated space. Lastly, experimental layouts of spaces and zones allowed for the re-introduction of topographies.

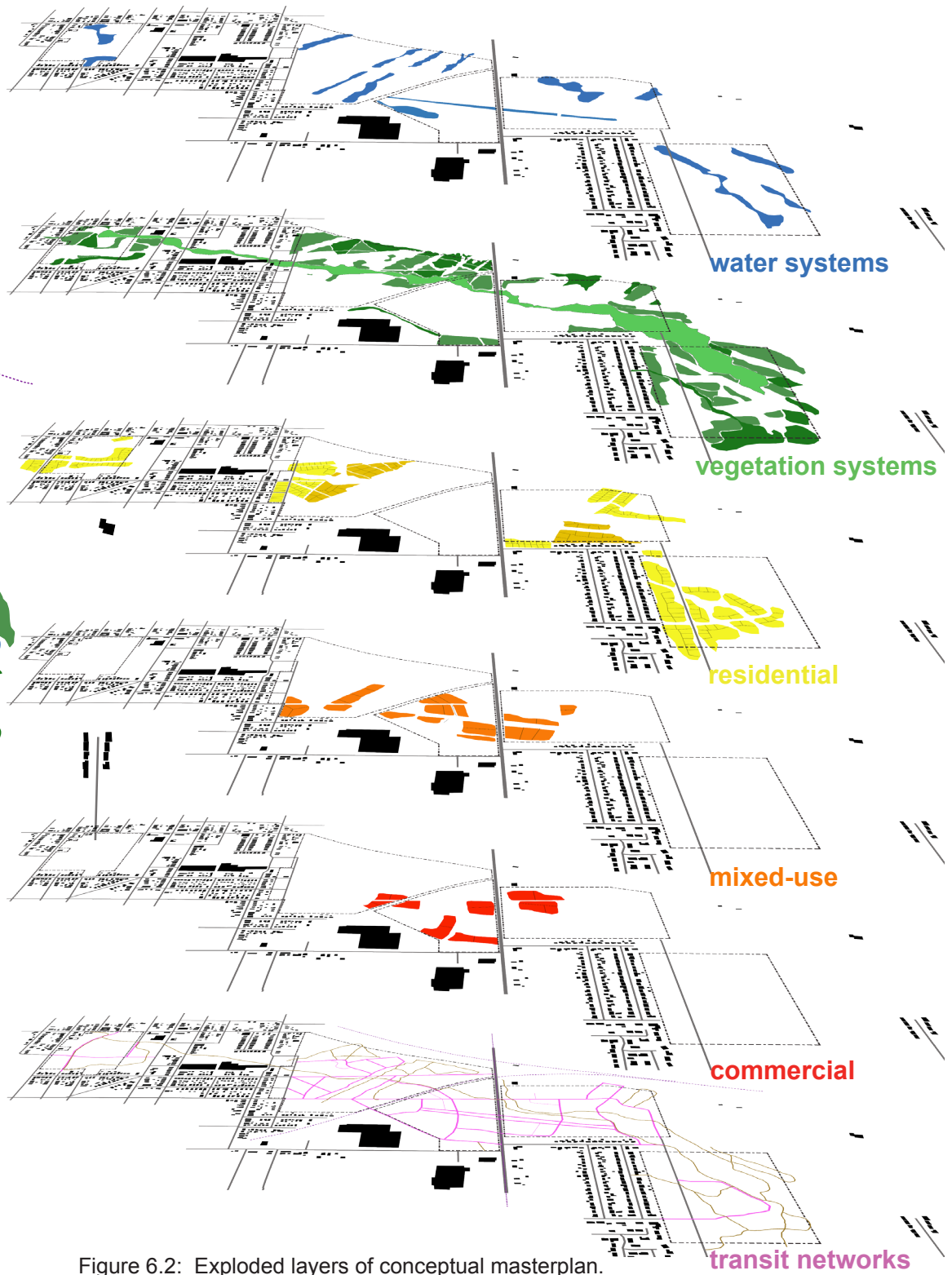


Figure 6.2: Exploded layers of conceptual masterplan.

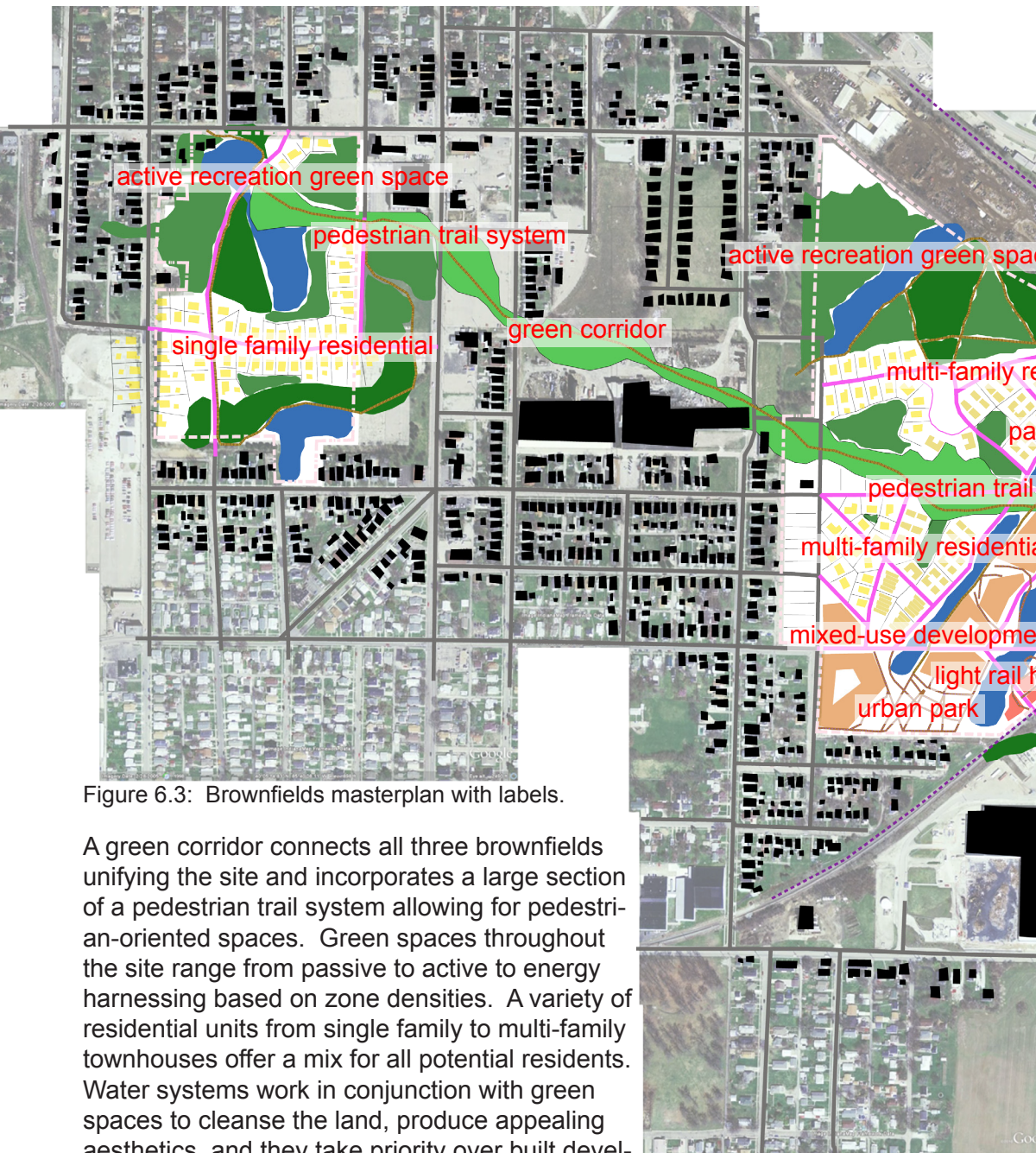
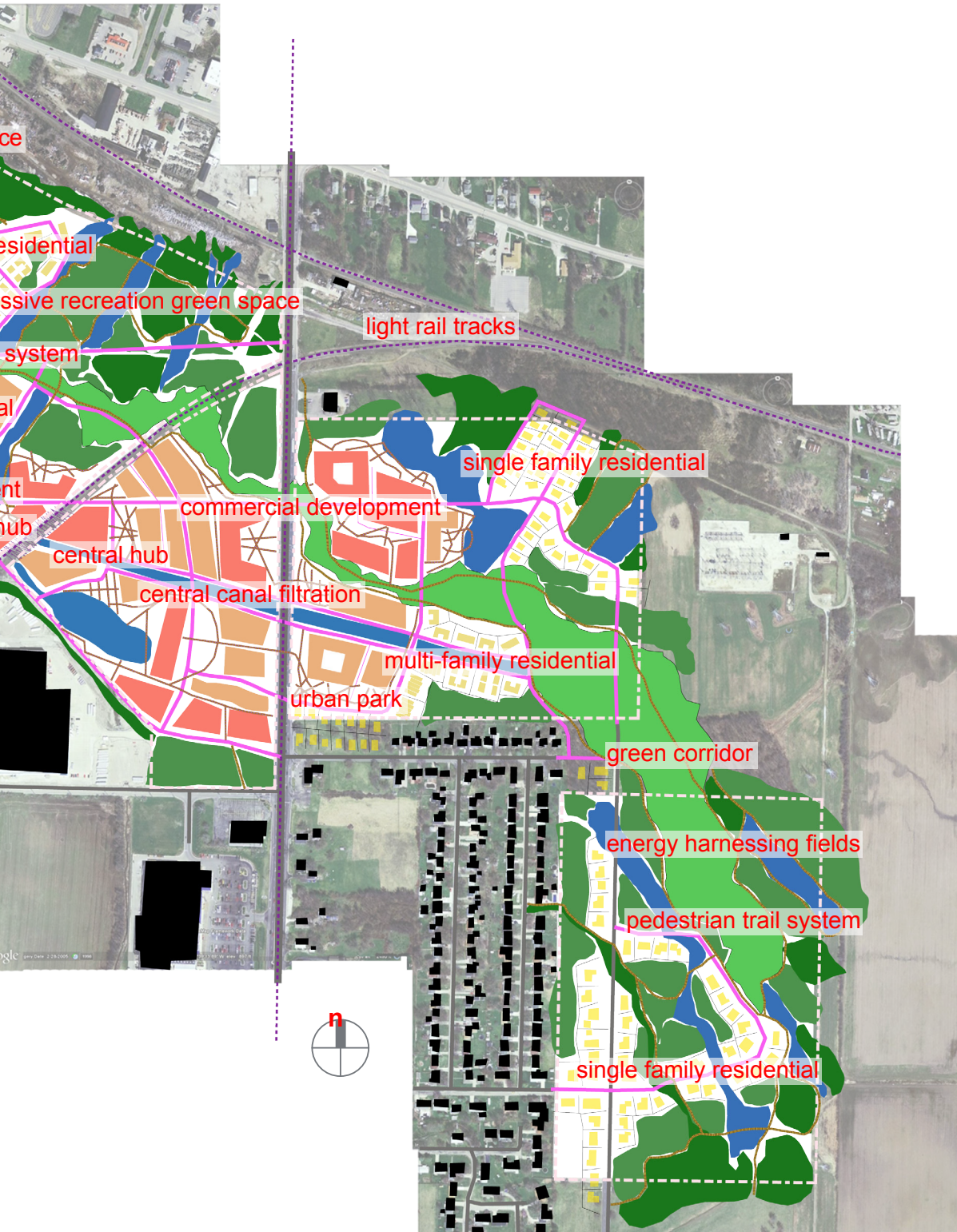


Figure 6.3: Brownfields masterplan with labels.

A green corridor connects all three brownfields unifying the site and incorporates a large section of a pedestrian trail system allowing for pedestrian-oriented spaces. Green spaces throughout the site range from passive to active to energy harnessing based on zone densities. A variety of residential units from single family to multi-family townhouses offer a mix for all potential residents. Water systems work in conjunction with green spaces to cleanse the land, produce appealing aesthetics, and they take priority over built developments. The central hub is complete with a light rail transit hub, urban parks and plazas, and a combination of mixed-use and commercial development. Rail transit and an extensive pedestrian network characterize the central hub and encourage walkability, cycling, and alternatives to the automobile.

brownfields masterplan



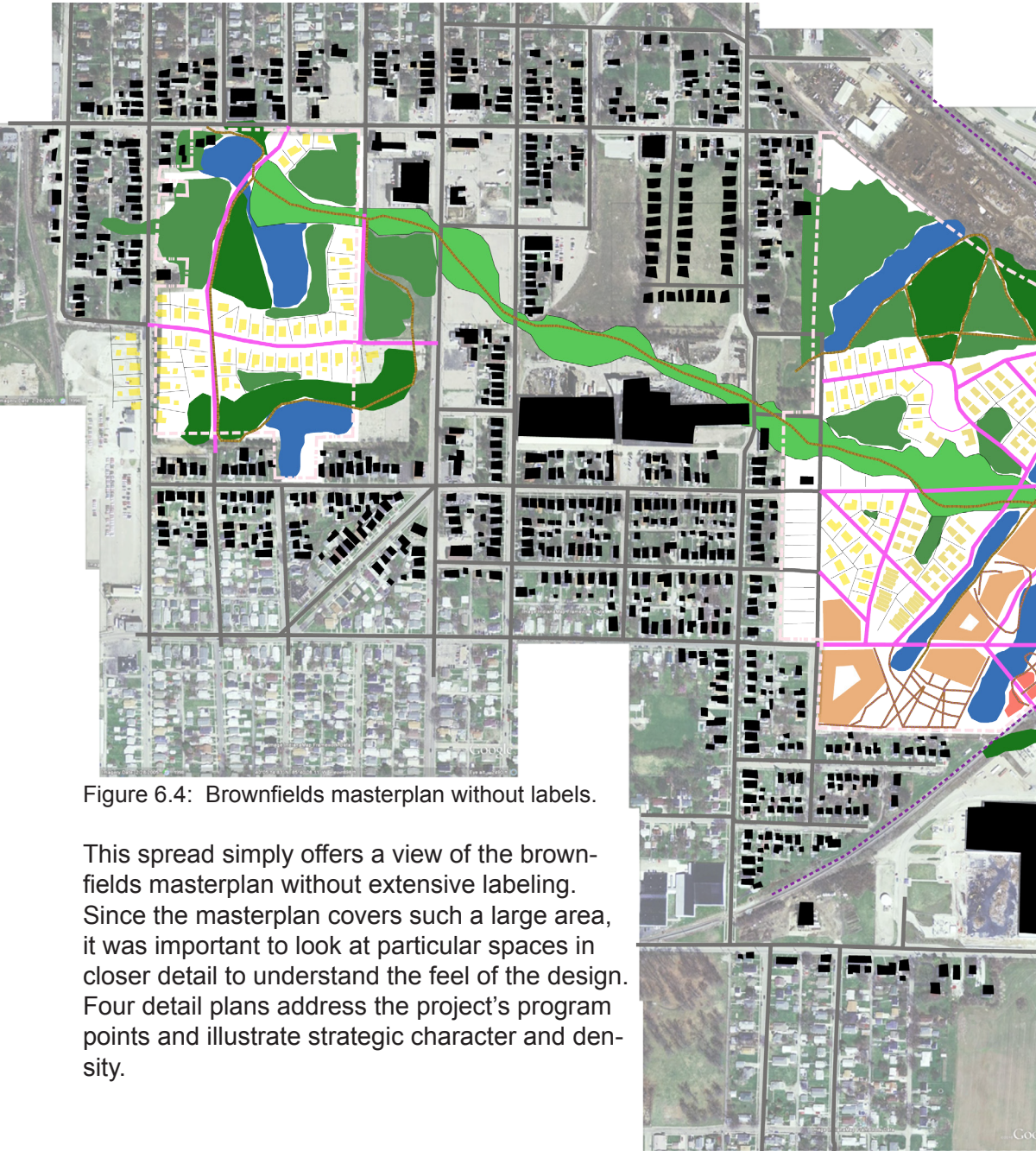
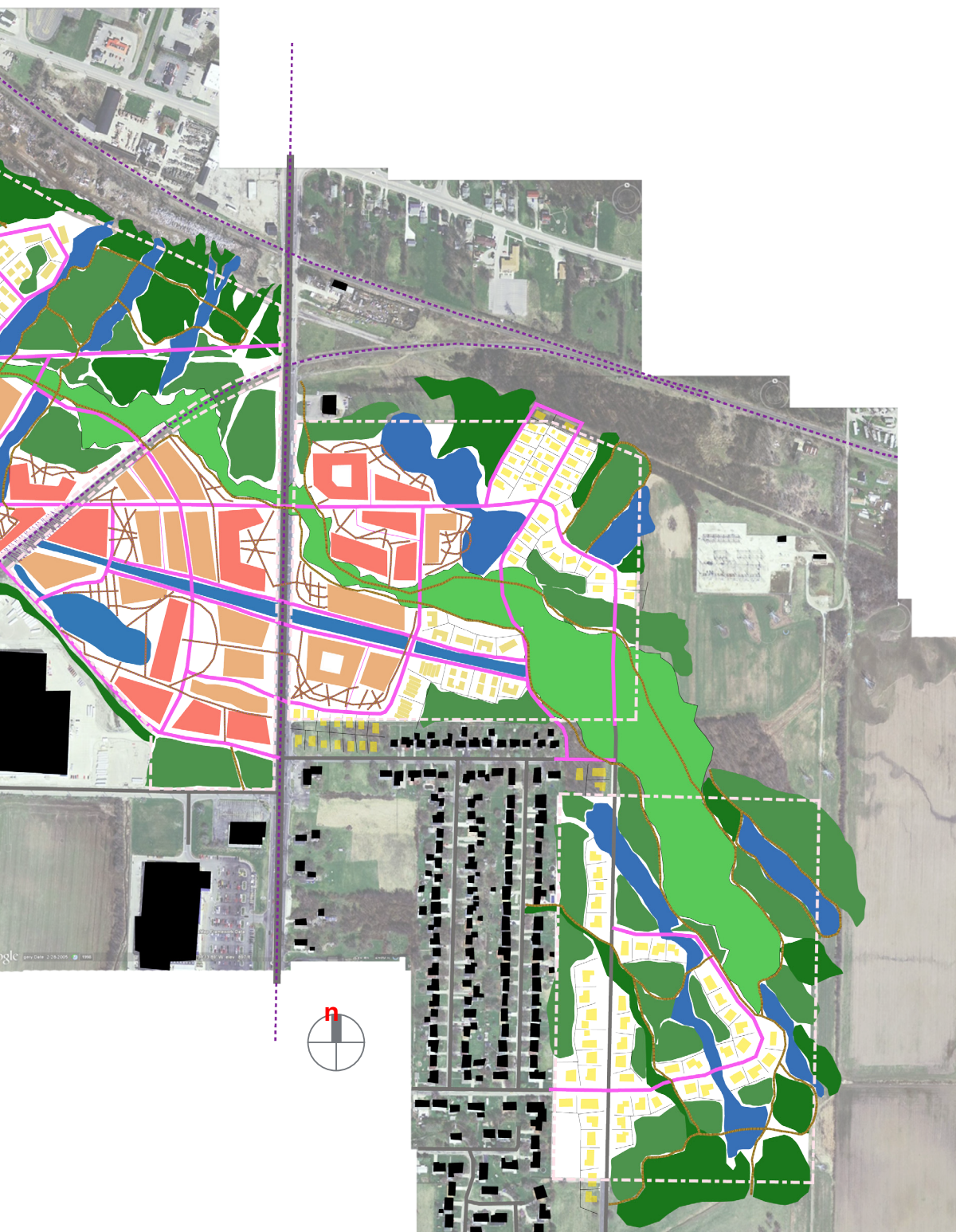


Figure 6.4: Brownfields masterplan without labels.

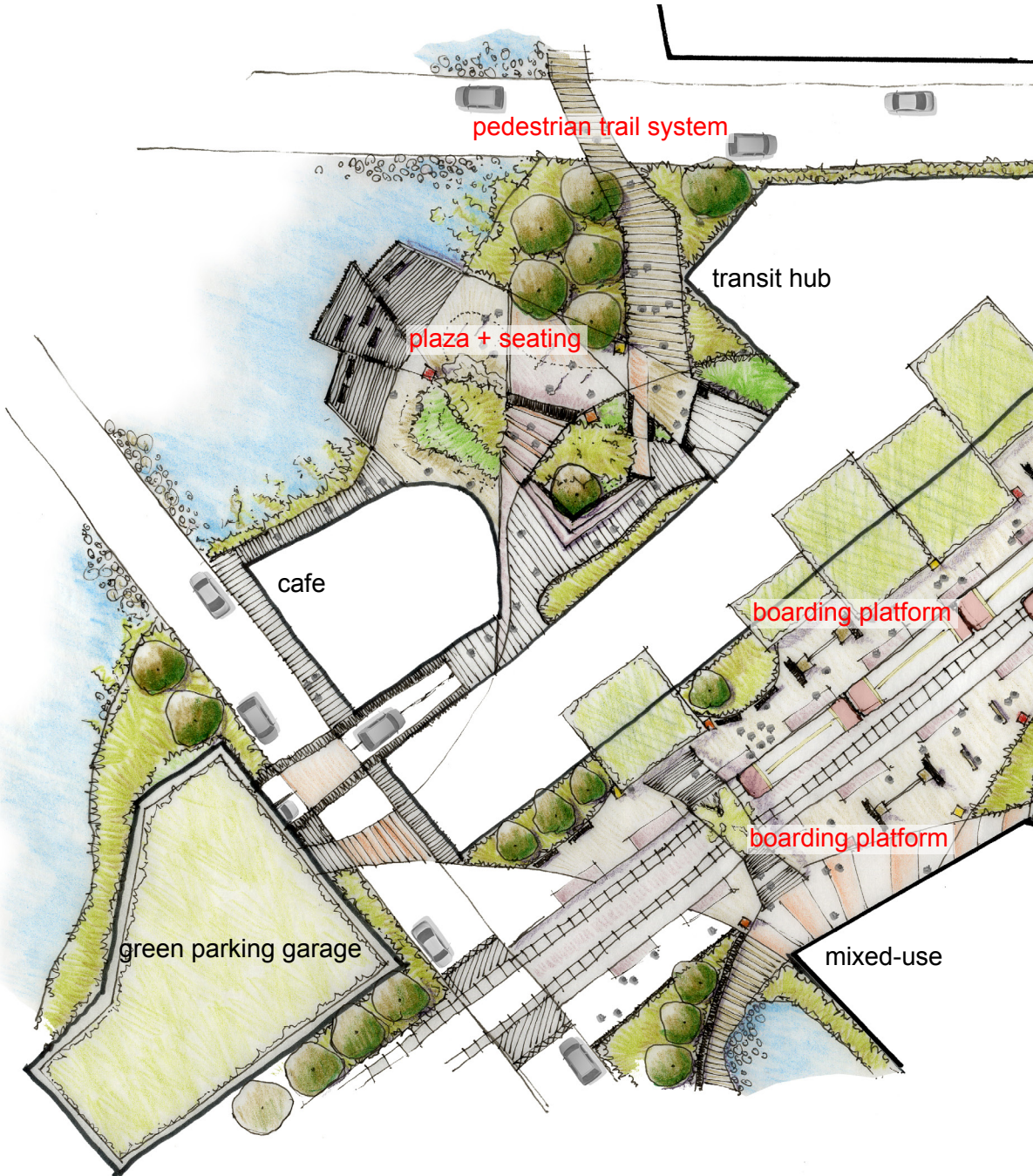
This spread simply offers a view of the brownfields masterplan without extensive labeling. Since the masterplan covers such a large area, it was important to look at particular spaces in closer detail to understand the feel of the design. Four detail plans address the project's program points and illustrate strategic character and density.

brownfields masterplan



light rail hub detail plan

program: sustainable mobility



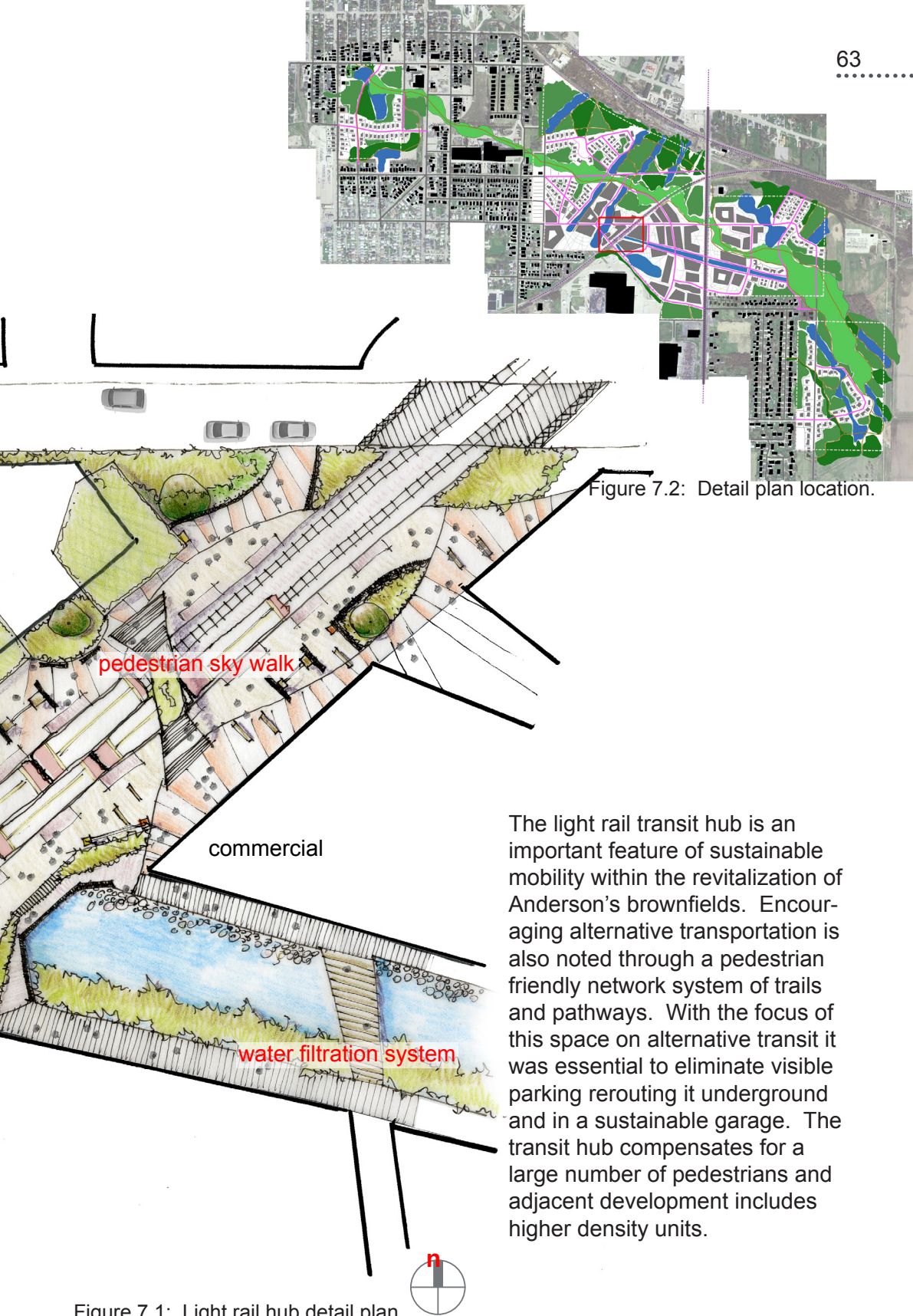


Figure 7.2: Detail plan location.

The light rail transit hub is an important feature of sustainable mobility within the revitalization of Anderson's brownfields. Encouraging alternative transportation is also noted through a pedestrian friendly network system of trails and pathways. With the focus of this space on alternative transit it was essential to eliminate visible parking rerouting it underground and in a sustainable garage. The transit hub compensates for a large number of pedestrians and adjacent development includes higher density units.

Figure 7.1: Light rail hub detail plan.



Figure 7.3: Sustainable mixed-use developments encourage live, work, and play.

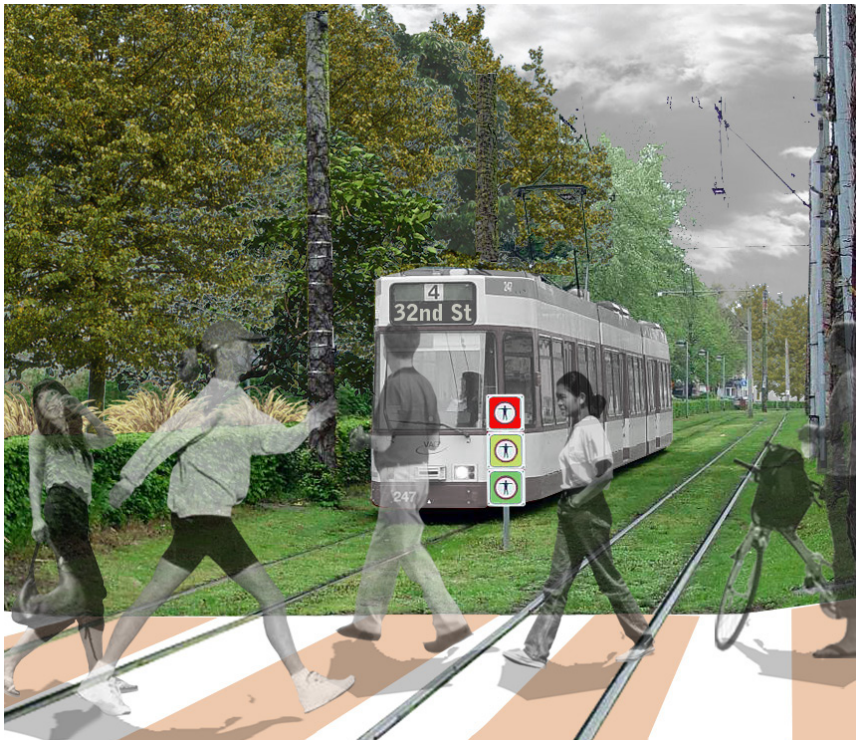


Figure 7.4: Light rail transit and pedestrian intersection in green corridor.

character of light rail

The light rail transit system introduces new character to Anderson beginning with mixed-use and commercial developments. They become a destination for live, work, play, and alternative transit and are environmentally conscious. Interesting architecture and unique pedestrian bridges provide functionality and aesthetic appeal. The light rail transit system has a minimal impact to the environment and uses existing frameworks, such as underutilized medians. The character and spaces of light rail ultimately gives prominence to pedestrians.

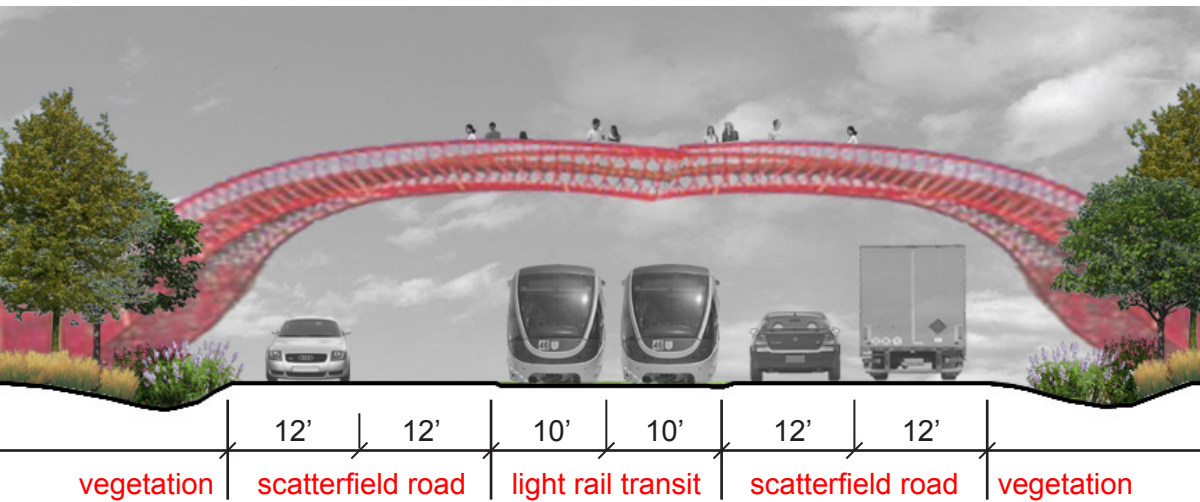


Figure 7.5: Section of Scatterfield Road.

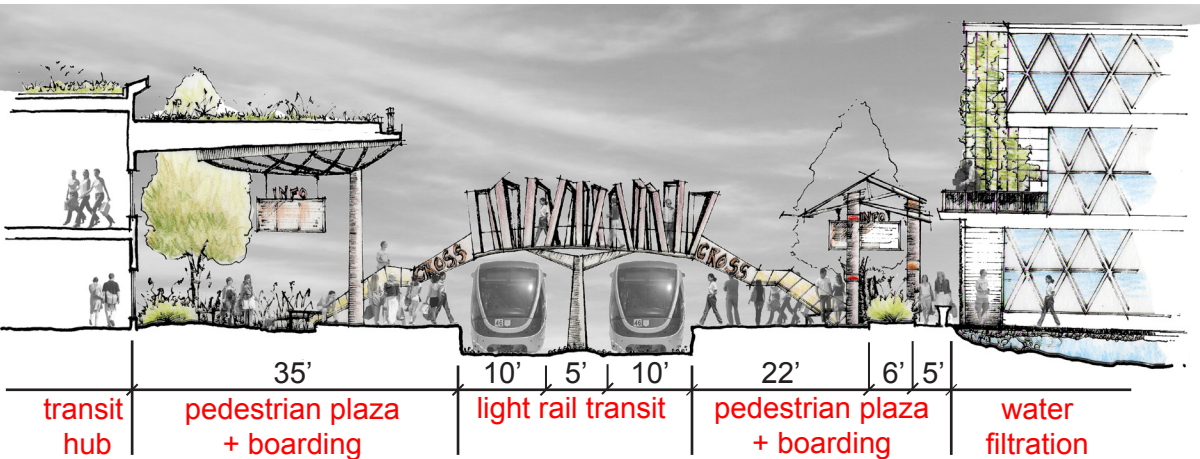


Figure 7.6: Section of light rail transit hub boarding zones.

urban plaza detail plan

program: urban metabolism



Like this urban plaza, other urban spaces throughout the design focus on establishing an urban metabolism. A balance of the built and natural environment exists in an urban setting. By incorporating natural vegetation and water filtration systems they take control of the space creating a living environment. Surrounding development includes both mixed-use and commercial accompanied by underground parking. Pedestrian networks wind through the plaza and buildings to propel pedestrian movement. The space also incorporates interactive lighting and water features as well as informative walls.



Figure 7.7: Urban plaza detail plan.

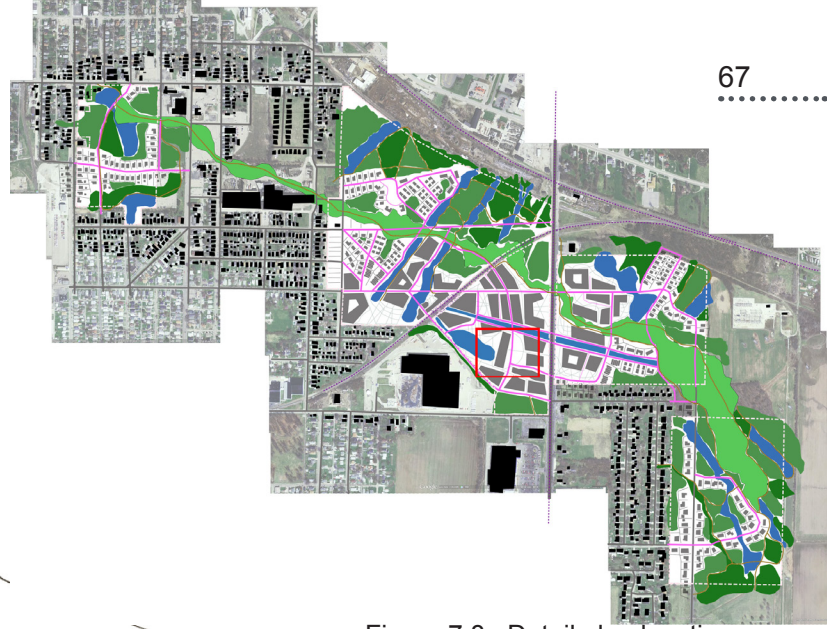


Figure 7.8: Detail plan location.



Figure 7.9: View of the tiered water filtration system.

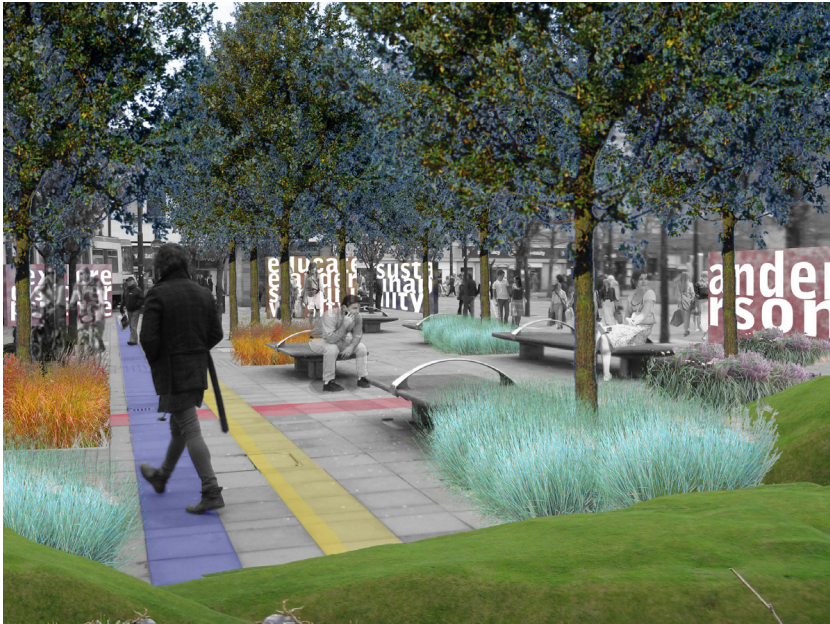
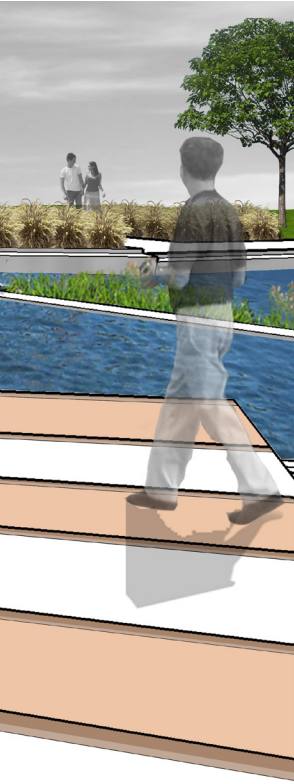


Figure 7.10: View of plaza seating spaces and informative walls.

character of urban plazas



Urban plazas combine water and vegetation systems, art, sculpture, and sustainable architecture to create a living space. Tiered water filtration systems capture and cleanse stormwater in multiple levels. Vegetation not only assists in cleansing runoff but adds aesthetic appeal. When water levels are low the tiered system provides amphitheater seating around its perimeter. Vibrant lighting and informative walls engage and intrigue pedestrians. Trees offer shade over benched seating and add a human scale compared to the built development. Small landforms add vegetation, seating, and identity to the plaza. With parking reverted to underground garages, it increased the amount of available pedestrian space.

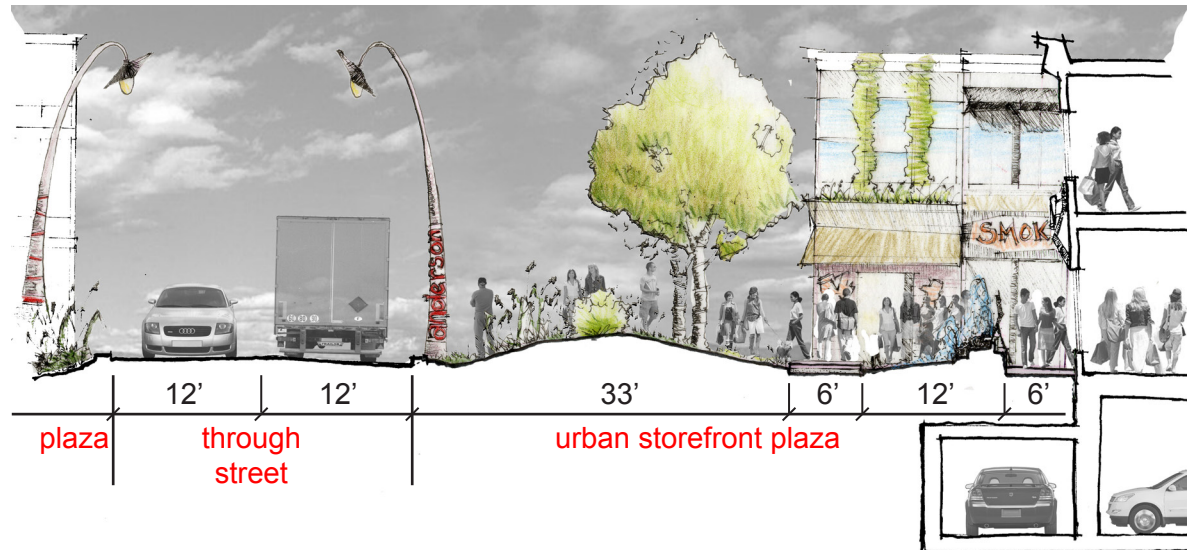


Figure 7.11: Section of urban storefront plaza with underground parking.

residential detail plan

program: scale, connections, linkages



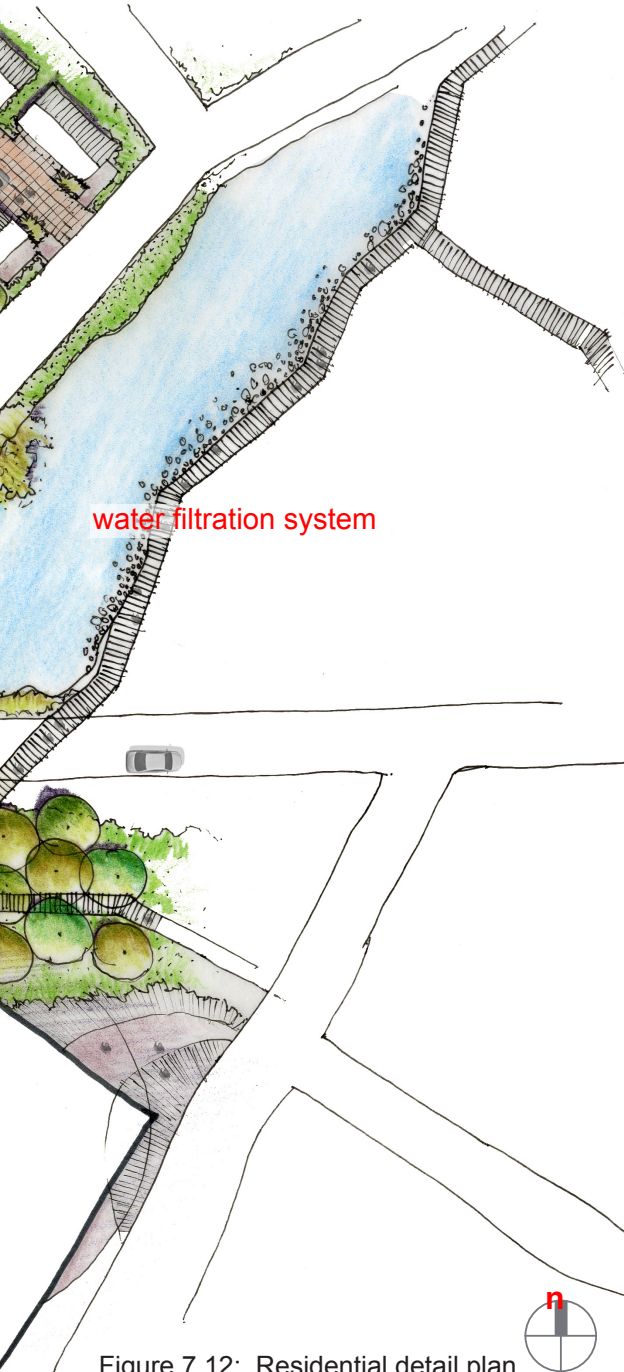


Figure 7.12: Residential detail plan.

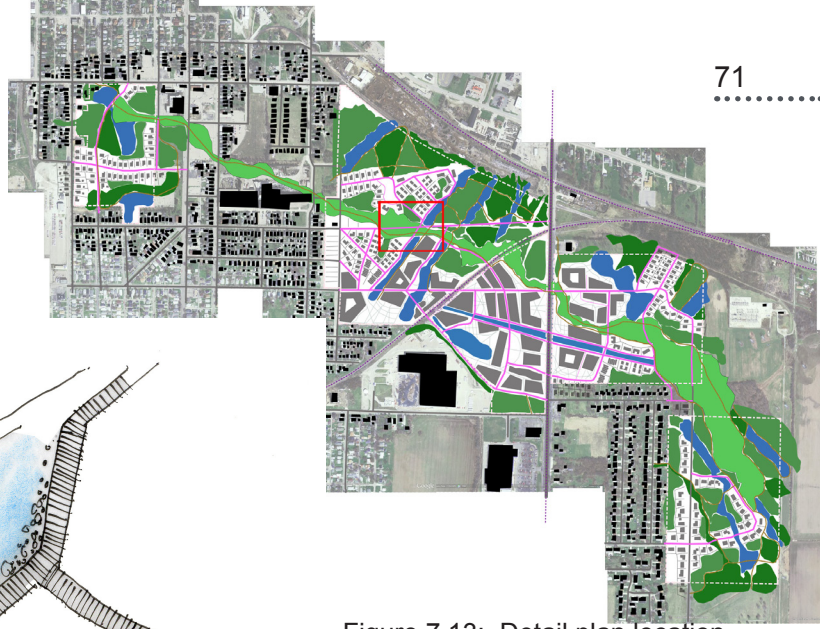


Figure 7.13: Detail plan location.

Most notable characteristics in scale, connections, and linkages form as development zones change. Multi-family residential units are incorporated throughout the design and act as the perfect medium when transitioning from high density to low density development. As the density decreases green spaces and natural areas are more prevalent, which allows for greater pedestrian network connections and off-site linkages. Residential developments, both single and multi-family, connect to existing neighborhoods encouraging pedestrian interaction.



Figure 7.14: View of multi-family townhouses and adjacent community space.

character of residential and open space

Residential developments range in density from single family to multi-family to mixed-use living. The combination of residential units creates a balance in densities throughout the design. Single family developments connect to surrounding neighborhoods as multi-family units encourage interaction with close neighbors. Shared spaces within residential communities provide land for community gardens or parks particular to the adjacent housing. Green spaces provide a variety of functions throughout the site. Passive and active recreation spaces allow residents a park setting escape while incorporating sustainable practices. On the other hand, natural green spaces distanced farther from the hub capture and harness solar energies as a source for alternative power.

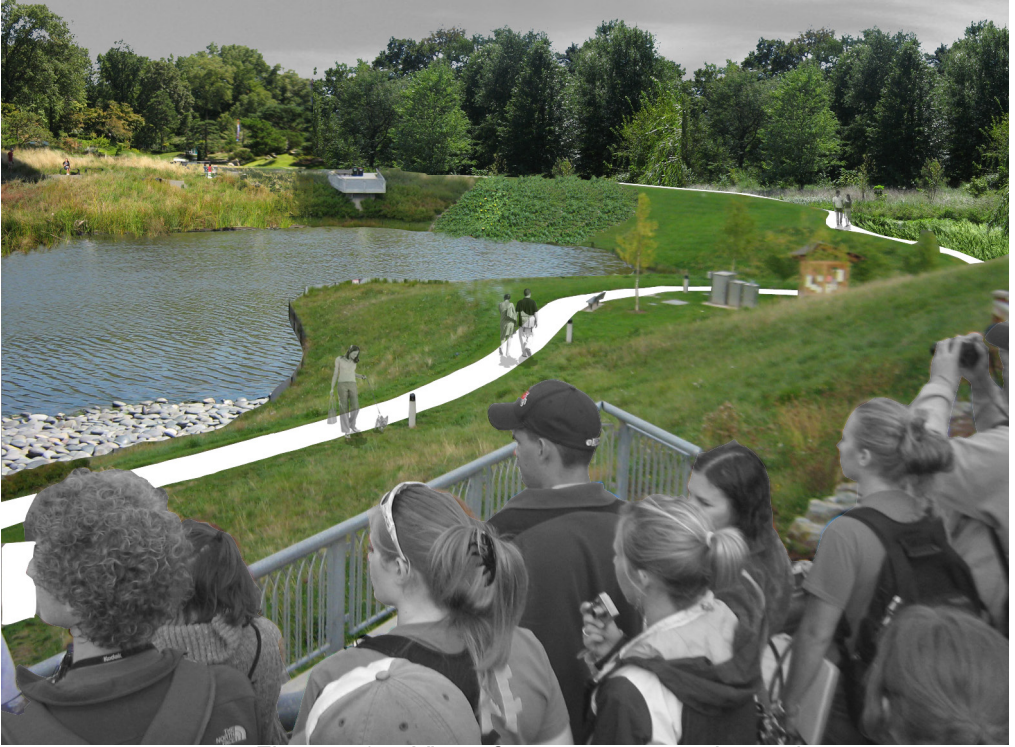


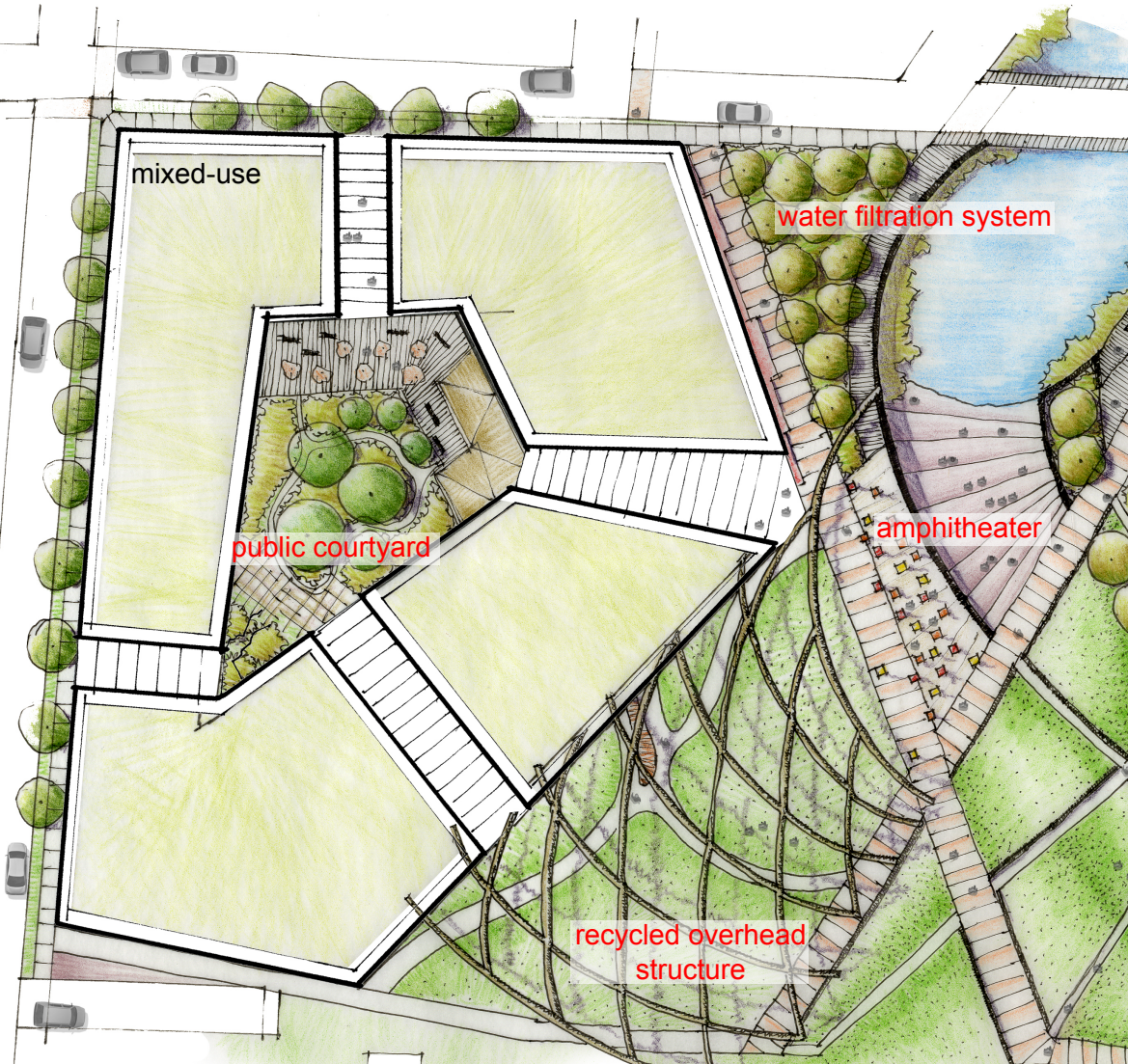
Figure 7.15: View of stormwater retention and treatment space.



Figure 7.16: View of energy harnessing natural green spaces.

mixed-use urban park detail plan

program: sustainability, demonstration, experimentation



Sustainability, demonstration, and experimentation create a unique program for design as it inspires creativity while being environmentally conscious. Mixed-use buildings evolve from their original footprints forming interesting internal passageways. Green roofs stand atop buildings and provide a cap to an underground parking garage. Sculptures in this urban park are constructed from recycled GM materials while fill soils form interesting landforms of varying heights. An amphitheater, capable of filling for flooding, leads pedestrians down to the water's edge.

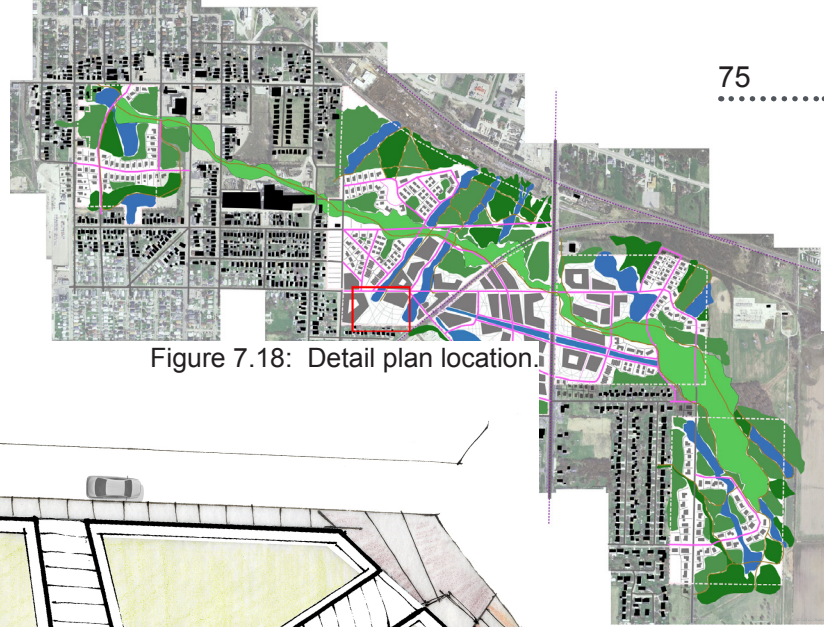


Figure 7.18: Detail plan location.

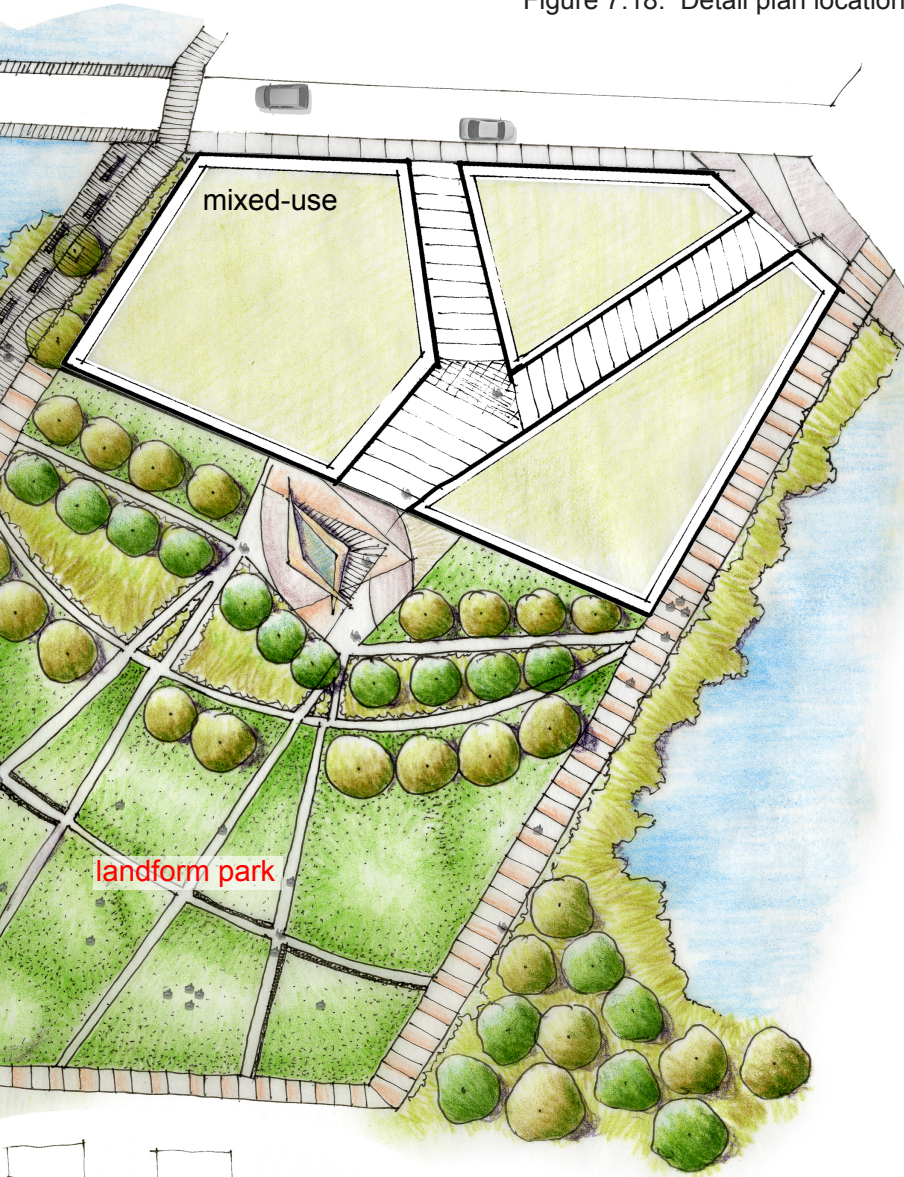


Figure 7.17: Mixed-use urban park detail plan.



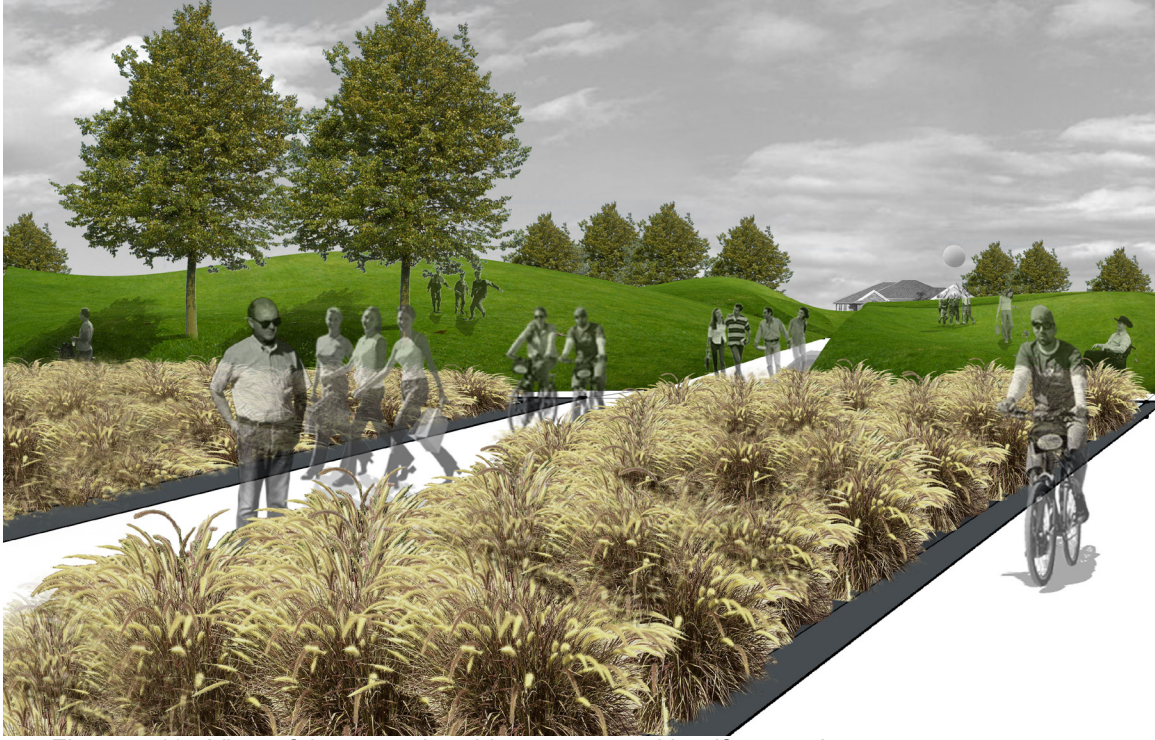


Figure 7.19: View of the natural prairie grasses and landform park.

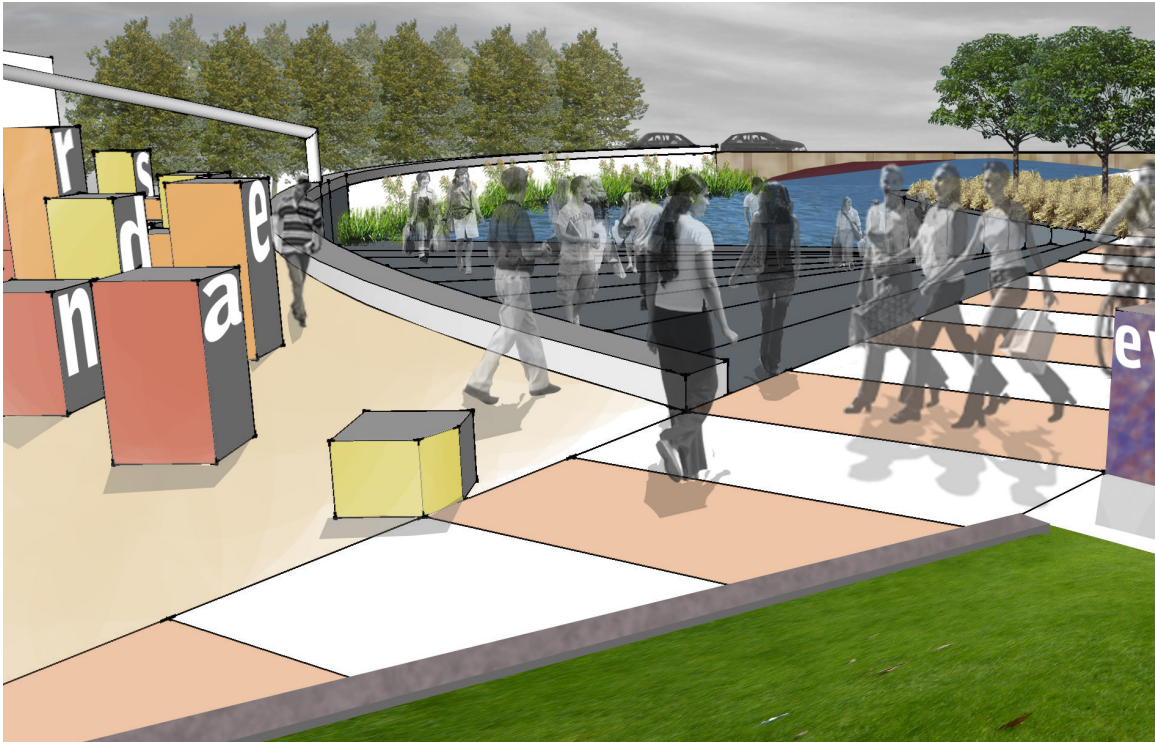
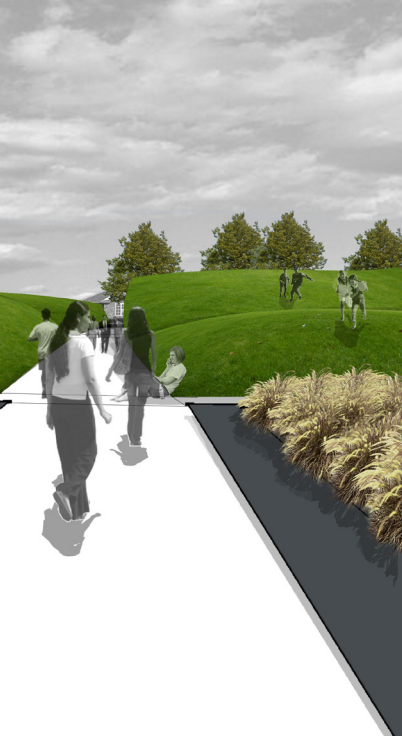


Figure 7.20: View of the amphitheater leading down to the water's edge.

character of urban parks



Some critics may consider urban parks and urban plazas the same type of space; however, this design differentiates the two urban spaces. Urban plazas are completely encompassed by higher density developments whereas urban parks connect lower and higher densities as well as connect new development with its surrounding.

Focusing on sustainability, demonstration, and experimentation, this park has an apparent man made feel. Wide walkways slice through interactive landforms of various heights. The landforms provide pedestrians with interesting views of the entire park and its surroundings. In some cases the landforms are supported by concrete walls, which display intriguing facts about landscape architecture and Anderson. A key component of the park is material reuse of GM materials, which provided an overhead structure and vibrantly colored columns. The amphitheater provides seating and is responsible for holding stormwater in large rain events. This urban park represents the idea of a constantly evolving landscape.



public courtyard planting plan

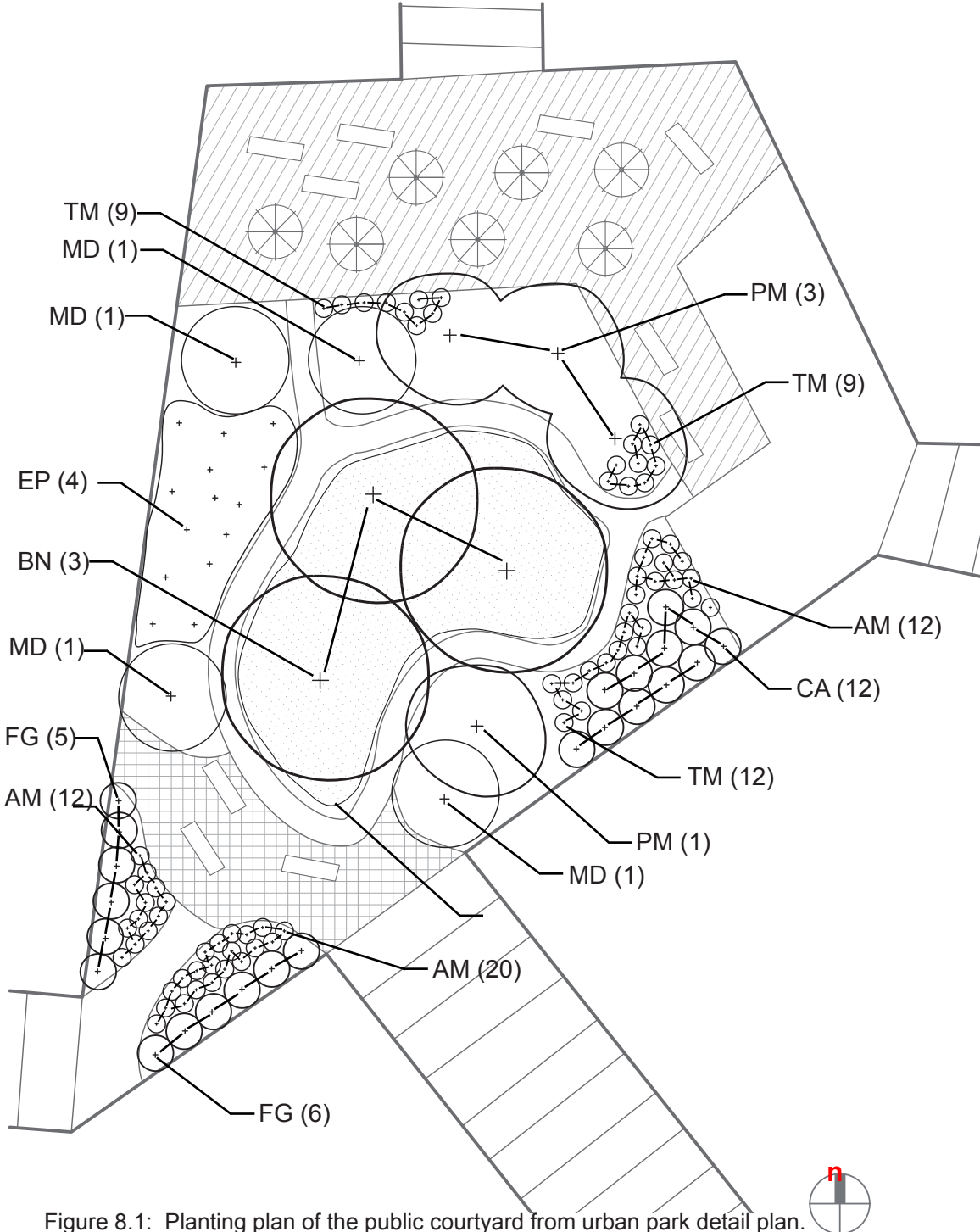


Figure 8.1: Planting plan of the public courtyard from urban park detail plan.

	Symbol	Quantity	Scientific Name	Common Name	Size	Com
Deciduous Trees						
	BN	3	<i>Betula nigra</i>	River Birch	8'	
Ornamental Trees						
	PM	4	<i>Prunus maackii</i>	Amur Cherry	6'	C
Shrubs						
	CA	12	<i>Clethra alnifolia</i> 'Creels Calico'	Creels Calico Summersweet	3 gal.	
	FG	11	<i>Fothergilla gardenii</i> 'Mount Airy'	Mt. Airy Dwarf Fothergilla	3 gal.	
	MD	4	<i>Microbiota decussate</i>	Russian Cypress	3 gal.	
Perennials						
	AM	5	<i>Alchemilla mollis</i>	Lady's Mantle	Qt-10/cs	
	EP	4	<i>Echinacea purpurea</i>	Purple Coneflower	Qt-10/cs	
	GO	27	<i>Galium odoratum</i>	Sweet Woodruff	Qt-10/cs	
	TM	3	<i>Tolmiea menziesii</i>	Piggyback Plant	Qt-10/cs	
Turf						
	PP	500 sq. ft.	<i>Poa pratensis</i> L.	Kentucky Bluegrass	5 lbs.	E

Figure 8.2: Part of the planting schedule for the public courtyard planting plan.



creels calico summersweet



lady's mantle



sweet woodruff



river birch



russian cypress



purple coneflower

Figure 8.3: Imagery of selected plants illustrating textures and colors.

project conclusion

(re)Envisioning Anderson's Urban Brownfields offers a vision for revitalizing General Motors brownfields in Anderson, Indiana. As deindustrialization swept across the nation it caused the automotive industry to flatline. Since Anderson was an automotive city it was left in economic shambles and littered with brownfields. This project demonstrates an extensive amount of revitalization efforts that could pull the city out of its depression.

Researching the history and site specific concerns of Anderson's General Motors brownfields, community needs, sustainable case strategies, and economical and environmental benefits provided a solidified base for design. With a vision of revitalization, the design focused on four program elements for design including: sustainable mobility, urban metabolism, scales, connections, and linkages, and sustainability, demonstration, and experimentation.

Sustainable mobility addresses transportation problems using a package of initiatives that ultimately reduce the need and reliance of the automobile. With the implementation of alternative modes of transportation the city's identity will transform from automotive industry to pedestrian friendly. A cohesive circulation system balances access, mobility, and movement throughout the site. The main features of the new circulation system include light rail transit and a pedestrian trail system. This system encourages pedestrians to take priority throughout the entire site while reducing the non-essential roadway infrastructure.

The design understands and sees the site as a living environment that balances environmental inputs and outputs. As the development matures, revitalization strategies will spread throughout the city of Anderson in hopes to establish the city as an organic whole. In more simple terms the design balances natural versus built systems in a symbiotic habit.

Creative attention at each scale allowed the establishment of spatial connection and encouraged attention to detail. The design reconnects the brownfields to their immediate context as well as the city of Anderson. A network of trail systems and pedestrian spaces establish a human scale throughout the design.

Lastly, design incentives and programs emphasize sustainable strategies allowing the project to pay for itself in the long run. Experimenting with new ideas, tools, and strategies for green development allowed for a unique design. This design is merely an initial step in helping the city but it demonstrates a vibrant and impactful revitalization vision that will change Anderson.

alumnae valley restoration
wellesley college, wellesley, ma

reconnects: *reconnects systems using topography and hydrology in ecological restoration processes*

restores: *soil remediation treats contaminated soils and restores site as a living system*



Figure 9.1: Imagery of Alumnae Valley Restoration in Wellesley, MA.

gas works park
seattle, wa

remediates: *bioremediation naturally detoxifies soil on-site*

recycles: *adaptive use of existing structures and landforms strictly for visual anchors*



Figure 9.2: Imagery of Gas Works Park in Seattle, WA.

duisburg-nord landscape park
duisburg, germany

evolving: *vegetation is slowly and ultimately succeeding all remaining industrial fragments*

reuses: *adaptive reuse of industrial fragments as design features and historic icons*



Figure 9.3: Imagery of Duisburg-Nord Landscape Park in Duisburg, Germany.

olympic sculpture park
seattle, wa

creates: *vegetation and sculpture create an urban park of the city*

unifies: *balance between built and natural environments provide a unifying urban infrastructure*



Figure 9.4: Imagery of Olympic Sculpture Park in Seattle, WA.

methodologies

The methodology is a plan of action for approaching the design of the project. The methodology will be used to research site specific concerns and opportunities for Anderson's General Motors brownfields, community needs to reconnect brownfield sites back into the city, sustainable and successful design strategies for redevelopment, and how brownfield redevelopment will benefit Anderson's economy and environment. The information and design strategies gather from each research problem will be applied to the design Anderson's General Motors brownfields. Historical, qualitative, and quantitative methods will be used to gather primary and secondary data for each sub-problem.

To understand site specific concerns and opportunities for Anderson's brownfields historical and descriptive research methods will be used to compile secondary data. Three areas of research for this particular problem include previous use, potential contamination, and cleanup strategies for the three selected brownfields. The information gathered on previous brownfield uses was mainly from two internet sites: the city of Anderson's website and a website covering the history of the Delco-Remy Division of General Motors. The information and data collected on the history of Anderson's brownfields will be interpreted through a thorough content analysis. The Environmental Protection Agency's website and print resources, which can be downloaded via the internet, provided a road map for determining potential contamination of brownfield sites. Based on the potential contamination of the brownfields a cleanup strategy will be selected and incorporated into the design. Information about remediation strategies by Thomas Russ in "Redeveloping Brownfields" is an important source for reviewing remediation technologies. This book is available at the Architecture Library at Ball State University. The information for this topic will be secured through aerial photos, library research, and site visits.

Collecting information on community needs in Anderson will be a compilation of primary and secondary data. To understand the needs of the community in an attempt to reconnect brownfields to the city a review of Anderson's consolidated plan will be essential. The consolidated plan is available for download or viewing via the city's website. The information from the city document will be noted using qualitative content analysis. Primary data of community needs will be collected through interviewing and surveying residents, city employees,

and surrounding business owners. Specific individuals that will be interviewed include, but are not limited to: Mayor Kris Ockomon, city Landscape Architect Tamera Doty-Davis, and Director of Economic Development Linda Dawson. This information will be documented through notes, statistics, and charts.

To determine sustainable and successful design strategies for brown-field redevelopment secondary data will be collected through the review and analysis of existing redevelopment projects. Case studies of high profile brownfield projects will provide key design techniques and strategies. These case studies are found in journal articles and books at the Architecture Library as well as on the design firm's website. Michael Van Valkenburgh's Alumnae Valley Landscape Restoration and Latz + Partner's Duisburg Nord are two exemplary projects that transform brownfields to green fields. The Sustainable Site Initiative (SSI) is a pilot project program focusing on green, sustainable development. Pilot projects Hope Crossing neighborhood in Oklahoma and Atlanta's mixed-use development Glenwood Park are prime examples of live, work, play redevelopment projects. All SSI information is available direct on their website. Timothy Beatley's book "Green Urbanism: Learning from European Cities" discusses innovative design trends in Europe and how they can be implemented in American design. It will be important to document key findings through note taking, sketches, and scans.

To determine economical and environmental benefits for redeveloping Anderson's brownfields secondary data will be collected using quantitative research methods. Information on ecological and environmental benefits will be collected through books available at the BSU Architecture Library and from the city of Anderson's website. The book "Brownfields: Cleaning and Reusing Contaminated Properties," Charles Bartsch and Elizabeth Collaton is used to gain an understanding of how brownfield redevelopment benefits a city economically. On the other hand, Christopher DeSousa's book "Brownfields Redevelopment and the Quest for Sustainability" is an important source for understanding environmental benefits of brownfield redevelopment. Finally, reviewing Anderson's information on brownfields will reveal how redevelopment of General Motors brownfields can benefit the city and community. The data will be secured through library and internet research while documenting through notes, statistics, and summarizations.

definitions and acronyms

Air Sparging: remediation technology that injects air into groundwater to flush VOCs.

ARC: Anderson Redevelopment Commission

BEDI: Brownfields Economic Development Initiative

Bioremediation: use of microorganisms to break down contaminants in soil, sediments, or water.

COA: City of Anderson

EPA: Environmental Protection Agency

Fuels: chemicals created by petroleum and natural gas to create energy.

IDEM: Indiana Department of Environmental Management

IFA: Indiana Finance Authority

Halogenated: organic compounds that has a halogen (fluorine, chlorine, bromine, or iodine) attached to it.

HUD: Housing and Urban Development

Industrial Brownfields: abandoned buildings and lands that were previously used for industrial purposes but are now polluted and underutilized.

Metals and Metalloids: natural elements extracted from earth for use in industrial processes.

Multi-Phase Extraction: contaminant cleansing technology of multiple phases that usually results in lowering the water table.

NBA: National Brownfield Association

Non-halogenated: organic compounds that do not have a halogen attached to it.

Phytoremediation: use of plants to remove or stabilize contaminants in soil, sediments, or water.

Redevelopment: the process of rebuilding or replanning underutilized, degraded, and inhabitable spaces in such a way that benefits a community's environment, economy, and aesthetic.

Remediation: natural and biological approach to clean contaminated lands.

Revitalization: the process of restoring underutilized, degraded, and inhabitable spaces to revive environment, character, and usage.

RFP: Request for Proposal

Semi-Volatile Organic Compounds (SVOCs): organic compounds that cannot be easily become a vapor or gas.

Soil Vapor Extraction (SVE): uses vapor extraction wells to release volatilized contaminants into the air, sometimes used alongside air sparging or air injection systems.

Solvent Extraction: use of solvents to remove contaminants from soil or sediments.

Sustainable Strategies: design principles that are environmentally sensitive and allow a site to maintain self-efficiency.

Urban Corridor: areas and zones of land that connect urban environments through a balance of natural and built materials.

Urban Space: spaces within an urban environment that maintain a specific program in order to connect the urban.

USGS: United States Geological Survey

Volatile Organic Compounds (VOCs): organic compounds that can easily become vapors or gases.

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